**Bunker Hill Mining and Metallurgical Complex Superfund Site**
**Operable Unit 3**

**Human Health Response**
**Coeur d'Alene Basin Project**
**Residential, Commercial and Rights-of-Way**

# 2011 Remedial Design Report

May 2011


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# Glossary

*Access Controls* – Restrictions to property ingress and egress in the form of physical barriers (e.g., fences or barricades), or legal statute (e.g., Interstate 90 corridor).

*Barrier Enhancement* – Augmenting or otherwise increasing the effectiveness and/or durability of existing barriers to minimize potential exposure to underlying contaminants (also known as Greening).

*Clean Material* – Clean replacement material (including soil, gravel, etc.) is considered to contain less than 100 mg/kg lead, 35 mg/kg arsenic and 5 mg/kg cadmium based on the average of backfill sampling results. No single sample of replacement materials will exceed 150 mg/kg lead or 45 mg/kg arsenic.

*Commercial Property* – Retail, wholesale and second-hand businesses, public use areas and common use areas (e.g., parks, schools and playgrounds), recreational areas (e.g., boat ramps, picnic areas, and campgrounds), and public buildings (e.g., local government buildings and churches).

*Type I Commercial Property* is accessible to the sensitive population and/or has unrestricted access.

*Type II Commercial Property* is inaccessible to residential areas and/or sensitive populations.

*Contractor* – Contractor responsible for yard remediation

*Technical and Remedial Services Contractor* – Contractor responsible for operating and maintaining repositories and providing remediation technical support.

*High Risk Property* – High-Risk properties are defined as those exceeding the lead or arsenic cleanup levels and meet one or more of the following criteria:

- Residences having children six years of age and under.
- Residences with pregnant women.
- Licensed Day Care Centers.
- Residences where the most recent blood lead survey indicates that children in the residence have a blood lead level equal to or greater than 10 µg/dl and the PHD has determined that the yard soil exposure is a significant exposure pathway.

*Mobilization/Demobilization* – Mobilization is the moving of all essential equipment, materials, and personnel necessary to remediate the property or a group of properties adjacent to or in close proximity to each other. This includes sanitary facilities, traffic control, and other site control, or health and safety activities. Demobilization is the removal of all equipment, materials and personnel from the site.

*Residential Property* – Property used by private individuals or families as a residence.

*Right-of-way Property* – Property adjacent to state, county, local, and private highways, streets and roads or utility corridors.

*Type I ROW* is located adjacent to residential property or Type I commercial property.

*Type II ROW* is located adjacent to Type II commercial property or in an undeveloped area.

*Type III ROW* is located where access is restricted.

*Sensitive Population* – Pregnant women and children up to 12 years old.

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# 1.0 INTRODUCTION

The purpose of this Remedial Design Report (RDR) is to provide the Idaho Department of Environmental Quality (IDEQ) and U.S. Environmental Protection Agency (EPA) with a process to identify the properties within Operable Unit (OU) 3 of the Bunker Hill Mining and Metallurgical Complex, also known as the Coeur d'Alene River Basin (Basin), that are eligible for soil remediation, to determine the appropriate remedial action, and to clean up the property. This RDR also provides methods for domestic water well abandonment and establishment of alternative water supply for private properties identified as requiring such. Basin properties for this RDR include rights-of-way, and commercial and residential properties. Remediation activities for OU1 (Populated Areas) and OU2 (Non-Populated Areas) of the Bunker Hill Mining and Metallurgical Complex Site are identified in Box (OU1 and OU2) remediation documents. This RDR is adapted from the following Box RDRs:

- Final Residential Yards, Remedial Design Report (MFG 1994a).
- Final Commercial Property, Remedial Design Report (MFG 1994b).
- Final Rights-of-Way, Remedial Design Report (MFG 1994c).
- Final Water Well Closure, Remedial Design Report (MFG 1994d).

Remediation of residential property will include the following elements:

1. Barrier enhancement for residential property with a lead content ≥700 mg/kg but less than 1000 mg/kg,
2. Soil removal and replacement for property with a lead content greater than or equal to 1000 mg/kg or an arsenic content greater than or equal to 100 mg/kg, and
3. Alternative drinking water supply for residences with an arsenic content greater than 10 ug/L, a cadmium content greater than 5 ug/L, or a lead content greater than 15 ug/L.

These elements represent the cleanup strategy identified for Basin properties described in the Bunker Hill Mining and Metallurgical OU3 Basin Record of Decision (EPA 2002). Basin commercial properties and rights-of-way with a lead content greater than or equal to 1000 mg/kg or arsenic content greater than or equal to 100 mg/kg remediated in a manner similar to those remediated in the Box. Private domestic water supply remedial actions are also similar to those conducted in the Box.

This RDR presents performance objectives and standards, technical analysis, design and construction specifications for remedial action activities for the identified Basin properties. In addition, this RDR addresses future operation and maintenance requirements and lists future deliverables required for Basin property remedial actions.

## 1.1 OVERVIEW

The Box Residential Yards RDR (MFG 1994a) was developed to address residential soils within the 21 square mile Box. Since 1994, more than 2,000 homes have been remediated according to these criteria. Evaluation of cleanup activities conducted and subsequent reductions in blood lead absorption among children in the Box concluded that the cleanup strategy has directly contributed to reductions in children's blood lead levels. Analyses conducted in the Human Health Risk Assessment (HHRA) for the Basin later concluded that implementation of a similar strategy for residential property in the Basin would, in combination with other measures, reduce lead and arsenic exposure to the Basin population to acceptable levels. As a result, essentially the same cleanup plan for residential and commercial properties and rights-of-way is being employed in the Basin as had been used in the Box. Consequently, the Box Residential Properties RDR was modified for use on Basin residential properties.

The Box Commercial Property RDR (MFG 1994b) and the Box Rights-of-Way RDR (MFG 1994c) were developed to control direct contact with contaminants and contaminant migration from these

properties within the Box. Based on the analyses of the Basin HHRA and to have a consistent approach to remedial activities, a similar cleanup plan is also employed for commercial property and rights-of-way in the Basin. The Box Water Well Closure RDR (MFG 1994d) was developed to identify wells requiring closure, provide closure requirements, and provide requirements for connecting residences to existing public water district systems.

Specifically, this RDR provides:

- A sampling method for determining the need and/or level of remedial action required at individual properties in the Basin.
- The criteria for selecting the specific remedial action.
- Procedures and specifications for implementing the selected remedial action.

The communities and rural property where these criteria will apply are based on high-risk property, floodplain property and other property identified from previous and future Basin sampling events. The areas considered for cleanup, where a property abuts undeveloped adjacent property, will include only those contiguous areas clearly used in conjunction with that property.

## 1.2 PERFORMANCE OBJECTIVES AND STANDARDS

IDEQ and the EPA have selected remedies for residential soils at or above the threshold lead concentration of 700 mg/kg or the arsenic concentration of 100 mg/kg.

A tiered approach to soil action levels has been defined for Basin residential properties. For Basin residential properties with soil lead levels between 700 mg/kg and 999 mg/kg, a barrier enhancement remedy will be available (see Section 8.0). For residential properties that have yard soil levels equal to or exceeding 1000 mg/kg lead or 100 mg/kg arsenic, the same partial soil removal and replacement remedy used for OU1 will apply (see Section 1.3.2).

Remedies for commercial property and rights-of-way also were selected for areas at or above a threshold concentration of 700 mg/kg lead or 100 mg/kg arsenic. For Basin commercial property and rights-of-way equaling or exceeding the action levels, a greening or removal and replacement remedy will apply, similar to residential remediation (See Section 1.3.3 for commercial property and Section 1.3.4 for ROWs).

The remedies for residential property, commercial property, and rights-of-way address surface soils only. No remedy focuses on the complete removal of soil above the action level from these areas. The remedies focus on creating a barrier between the soil above the action level and the public, particularly young children. For the purposes of this RDR, soils above the action level are defined as soils with:

- Lead concentrations equal to or greater than 700 mg/kg.
- Lead concentrations equal to or greater than 1000 mg/kg.
- Arsenic concentrations equal to or greater than 100 mg/kg.

The OU3 ROD also includes remedies for private, domestic water supply wells at or above the threshold drinking water standards for metals of concern for this operable unit. Remedial action will occur where the domestic water supply well has an arsenic content greater than 10 ug/L, cadmium content greater than 5 ug/L, or the lead content greater than 15 ug/L.

### 1.2.1 Performance Objectives

The Basin property remediation performance objectives are to:

1) Reduce human exposure to lead and arsenic contaminated soils, sediment, and house dust exceeding health risk goals particularly in children up to 84 months of age.

2) Reduce human exposure to soils and sediments that would exceed a cancer risk of one in ten thousand.

3) Reduce ingestion of groundwater or surface water withdrawn or diverted from a private unregulated source that contains contaminants of concern exceeding drinking water standards and risk-based levels.

### 1.2.2 Performance Standards

#### 1.2.2.1 Soil Action Levels

Soil action level performance standards include:

- Conducting partial removal and replacement for residential, commercial and ROW properties with lead concentrations equal to or greater than the 1000 mg/kg or arsenic concentrations equal to or greater than the 100 mg/kg.

- Conducting barrier enhancement activities at residential properties, Type I commercial properties, and Type I ROWs with lead concentrations equal to or greater than the 700 mg/kg lead concentration threshold but less than or equal to 999 mg/kg.

The Remedial Action Objectives (RAO) with respect to arsenic in residential yard soils was established in the Basin ROD, and was selected based on risk-based preliminary remediation goals (PRG). Risk-based PRGs are intended to be protective of human health and were calculated in the *Human Health Risk Assessment for the Coeur d'Alene Basin Extending from Harrison to Mullan on the Coeur d'Alene River and Tributaries* (HHRA). Potential PRGs noted in Table 5-6 in the HHRA were 35 mg/kg for 0-6 year-old children exposed to arsenic in residential soil (ingestion and dermal, non-cancer), 123 mg/kg child/adult lifetime (ingestion and dermal, non-cancer) and 64 mg/kg (ingestion and dermal, $10^{-4}$ cancer). Observed soil arsenic levels ranged from 17 mg/kg to 40 mg/kg across communities in the Basin with 95$^{th}$ %-tile concentrations of 21 to 51 mg/kg.

Subsequently, an arsenic cleanup action level of 100 mg/kg was selected for residential yards. All yards with soil levels greater or equal to 100 mg/kg arsenic in soil will be removed and replaced with a clean soil barrier. The clean replacement criteria (see Section 1.2.2.3 and memorandum in Appendix A-1) are consistent with projected post-remedial arsenic soil concentrations and the PRGs used to develop the cleanup criteria.

1.2.2.2 Barriers

Installing clean barriers are a critical component of the remedial actions in this operable unit. Therefore, installed barriers are required to prevent direct exposure to contaminated soil and migration of soil to dust in homes. Installed barriers also must have sufficient durability to minimize future operation and maintenance requirements. These installed barriers must not negatively impact existing infrastructure. Vegetative barriers must be continuous, sustainable, with no bare soil exposed.

No barrier may be necessary where exposure to contaminants doesn't pose a human health or environmental threat. Such an area would not exhibit material transportation, by wind, water or vehicular traffic.

1.2.2.3 Clean Soil Criteria

Clean replacement material (including soil, gravel, etc.) is considered to contain less than 100 mg/kg lead, 35 mg/kg arsenic and 5 mg/kg cadmium based on the average of backfill sampling results. No single sample of replacement materials will exceed 150 mg/kg lead or 45 mg/kg arsenic. Sampling will be conducted in accordance with procedures approved by IDEQ. The arsenic standard changed from 100 mg/kg in the Box (Operable Units 1 and 2) to 35 mg/kg for the Basin (Operable Unit 3). This arsenic level should be attainable for replacement material. Sampling of aggregates will follow ASTM D75-03 and all related sampling methods.

Testing will be conducted by an independent laboratory approved by IDEQ. When requested by IDEQ, samples are to be collected from potential borrow sources by the Contractor and analyzed by an independent laboratory. Sample results from borrow sources will be submitted to IDEQ in order to ensure that material from the sources will meet the product requirements. Additional sampling

and testing will be conducted during material placement for metals at a rate of one sample every 200 cubic yards from a given source. If tests or performance of materials do not meet the requirements, the Contractor will change material or material sources and retest until material meets the requirements. IDEQ will collect quality assurance samples for metals and other specification parameter analysis, at their discretion. Quality assurance sampling will be conducted on in-place material. In the event that Contractor quality control testing or IDEQ quality assurance testing identifies non-compliance for metals or other specification parameters, the Contractor will perform additional tests and if necessary, remove the material and place material conforming to the specification. The Contractor will perform required sampling and testing to show clean material complies with the specifications. Metal analysis will be conducted on the portion passing a No. 80 sieve. Total lead, arsenic and cadmium will be analyzed to determine if the sample meets the requirements stated above. Other material specification parameter results will be used to determine if the sample meets specification for the particular material (see Section 1.3.1). The Contractor is required to collect required samples, analyze samples, and report analytical results as specified. The Contractor is responsible for providing materials that satisfy specifications. The IDEQ may conduct additional sample analyses.

#### 1.2.2.4 Alternative Domestic Water Supply

For private, domestic drinking water supply wells exceeding the action levels for drinking water, an alternative drinking water supply will be established. Private domestic water supply wells will be closed or otherwise abandoned to discontinue use as a drinking water source. Alternative water supplies to replace these wells may include connection of the residence to an existing water supply district, provide point-of-use treatment, install a new groundwater supply well in a suitable aquifer, or other appropriate action identified by the IDEQ and EPA.

## 1.3 DESIGN CONSIDERATIONS

### 1.3.1 Clean Replacement Material

All replacement materials used shall meet the requirements described in 1.2.2.3. All materials that contain fines (material that passes a No. 80 sieve) must be sampled to ensure compliance with the requirements for metals concentrations. Additional sampling requirements for specific materials are as described in this section.

The Contractor will submit to IDEQ test results and other documentation of the materials and sources of materials a minimum of 5 working days prior to use, to demonstrate compliance with the specification and allow IDEQ to review the submittal. The Contractor will also provide material samples when requested by IDEQ, or its representative, to allow independent analysis and testing when IDEQ, or its representative, elects to do so. Samples will be 1.0 cubic foot, or as otherwise requested for each type of material and will be tagged with:

- Company name
- Material type
- Sample type
- Date
- Sample number (Example: F-JS-SP-070406-001)

Contractor will allow IDEQ to collect split samples.

*Soil*

Topsoil specifications will be divided into two categories as shown in Table 1A.

Table 1A. Topsoil Specification Categories

| Primary Specifications | Secondary Specifications |
|---|---|
| Gradation | pH |
| Texture | Salinity |
| Total Organic Matter | Cation Exchange Capacity |
| Lead | |
| Arsenic | |
| Cadmium | |
| Source Horizon | |

Representative samples (Primary and Secondary) will be collected using the ASTM D-75 sampling methodology. Using this protocol each representative sample is a composite of three samples, one from the top, one from the middle, and one from the bottom of the pile. No sample results will be evaluated for compliance or payment for samples collected using another methodology unless such an alternative methodology received prior written approval from IDEQ.

Primary specification compliance analysis will be conducted on at least one representative sample per 200 cubic yards to be placed. Samples will be collected in a stockpile before placement. Results for subsets of the pile will be provided to IDEQ at least 5 days before the soil is removed from the pile for placement.

Secondary specification compliance analysis will be conducted on at least one representative sample per 1,000 cubic yards to be placed. Samples will be collected in a stockpile before placement. Results for subsets of the pile will be provided to IDEQ at least 5 days before the soil is removed from the pile for placement. If, having evaluated at least 10 representative samples and such an evaluation shows compliance with acceptable variation in results, IDEQ may reduce the secondary characteristic sampling frequency further. Such a reduction shall be at the sole

discretion of the IDEQ in the best interests of the State.

Soil backfill for yards, flower beds, and other landscaped areas will be classified as a fertile, friable sandy loam topsoil as determined by the United States Department of Agriculture Classification System (see Figure 1). The topsoil should be obtained from the A Soil Horizon of a well-drained area. The moisture content will not exceed the optimum content of the material by more than 5 percent. Therefore the soil should be well-drained and have a moisture content that allows the soil to be worked. The topsoil will be free of large roots, glass, metal, plastic, and other foreign matter. The topsoil will not contain hazardous or toxic substances (e.g., heavy metals, PCBs, Dioxin), or deleterious material that may cause environmental contamination, hinder grading, planting and application, or be detrimental to maintenance of vegetative growth and vigor.

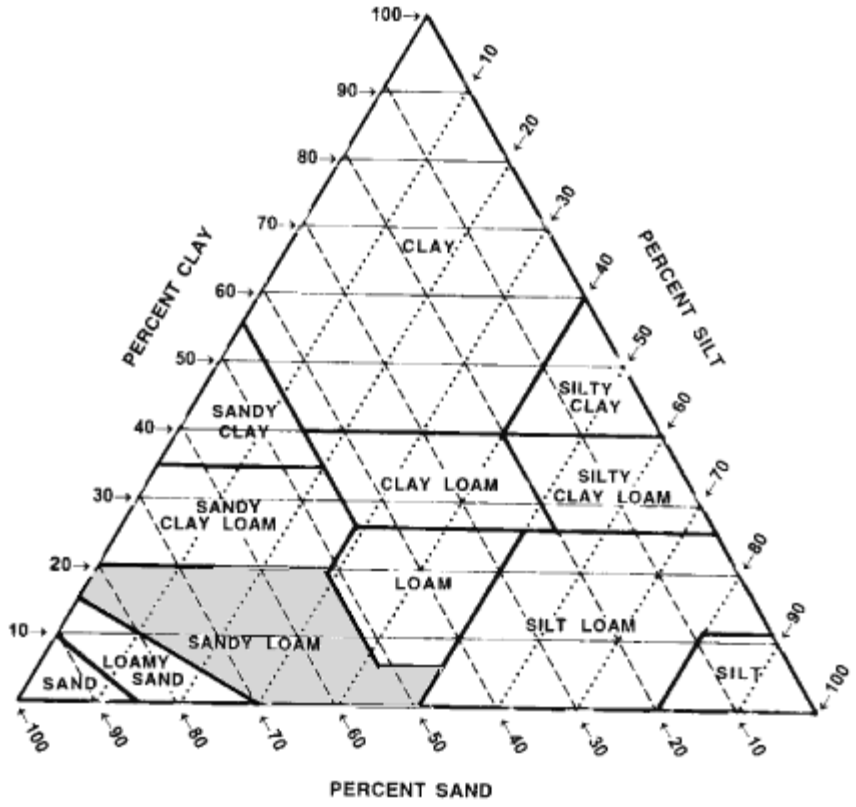


Figure 1. Soil Texture Triangle.

The soil will have a total organic matter content of 3% to 6% or greater by weight as determined by the American Society of Agriculture Method 29-2.2.4 (with a 1.7 multiplier per University of Idaho). The pH content will be between 5.3 and 8.0. Soil salinity will be less than 2.0 dS/m as determined by ASA 10-2. Cation exchange capacity of the soil will be 8 or greater as determined by EPA Method SW-846 9080/9081. Soil will have a maximum of 8% exchangeable sodium as determined by ASA 13-4 (1982). The soil particle size gradation will be as shown in Table 1B as determined by American Society for Testing and Materials (ASTM) method D422. Unscreened topsoil may be used in Rights of Way or commercial properties at IDEQ's discretion.

The topsoil will not contain any rock larger than ¾ inch in diameter. The soil will have physical characteristics suggestive of maturity, including a color of brown, dark brown or black (e.g., Munsell Color 3-6) and an acceptable or no odor (e.g., soil-like, moldy, or musty). Unacceptable odors include sour, ammonia or putrid odors. Replacement soil will have properties that promote plant growth. Nutrient analysis of backfill soil is not required, but may be requested if the soil source or performance changes. Additional testing will be required should the source or the material properties change, or the performance standards of the soil change.

Table 1B. Topsoil Gradation Requirements.

| Sieve Size | Percent Passing (by weight) |
|---|---|
| **¾ inch** | **100** |
| **½ inch** | **90 – 100** |
| **No. 10** | **30 – 70** |
| **No. 200** | **< 40** |

Garden soil will meet the above specifications, with the exception of the organic content. Samples will be taken from the entire 24 inch garden soil profile. The total organic matter content of garden

soil will be 6% to 10% by weight. Organic matter content will be calculated as the average of three (3) representative soil sample locations within a garden. That average must be between 6% and 10%. In the event of a disagreement between the laboratory used by the Contractor and the laboratory used by the IDEQ or their representatives, the results from the laboratory used by the IDEQ will govern. For garden soil, suitable aged compost amendment may be added to the topsoil to create the increased organic content. Compost will be derived from aerobic decomposition of plant material, manure or sludge. Sawdust, wood chips or other similar wood-waste must be fully aged (i.e., not recognizable) and will not be derived from treated wood.

Manufactured growth media is acceptable when such media satisfies the above requirements and modifications identified below. The organic content of manufactured growth media will be 10% to 15% by weight. Compost will not exceed 25% by volume composted debarking or log yard wastes. Some identifiable wood pieces are acceptable but the majority of the material will be soil-like without recognizable grass, needles or leaves. Compost will meet the gradation requirements identified in Table 1C. The moisture content will be 35% to 60%. Manufactured soil soluble salt content will be no more than 8 ds/m (electrical conductivity measured by EPA Method 120.1). Manufactured soil will be mixed using a pugmill or by spreading the soil and amendments on the ground and power-tilling, disking, harrowing or otherwise mixing the material in areas needing fill, as approved by IDEQ.

Table 1C. Manufactured Topsoil Compost Gradation Requirements.

| Sieve Size | Percent Passing (by weight) |
|---|---|
| 1½ inch | 100 |
| 1 inch | 90 – 100 |
| ¾ inch | 85 – 100 |
| No. 8 | 30 – 60 |
| No. 35 | 3 – 20 |

*Gravel*

The Contractor is required to conduct gradation testing for gravel in accordance with ASTM C117 and C136. Aggregate for gravel will not show a loss of more than 30 in the Los Angeles Abrasion Test in accordance with ASTM C131 and C535. Gravel durability will be conducted using sodium sulfate soundness test (ASTM C88 and D5240). Results are not to exceed 12% at 5 cycles. Testing will be conducted by an independent entity. Testing will be conducted initially to identify an appropriate source. Additional testing will be required should the source or the material properties change, or the performance standards of the gravel change. Gravel will allow compaction and drainage, but will not cause tracking concerns. The Contractor is required to collect required samples, analyze samples, and report analytical results as specified. The Contractor is responsible for providing materials that satisfy specifications. The IDEQ or its representative may conduct additional sample analyses or request sample splits from the Contractor. There are seven types of gravel.

1. Type I gravel materials are for uses such as road surfaces, pavement base materials, or in raised bed boxes. Type I gravel shall meet the gradation requirements for either the IDEQ Specification, or the ITD Specification as listed in Table 2A, and be approved by IDEQ prior to placement. IDEQ will determine the appropriate material specification based on the characteristics of the source material and field performance.

Table 2A. Type I Gravel Gradation Requirements.

| Sieve Size | IDEQ Specification | ITD Specification |
|---|---|---|
| | Percent Passing (by weight) | Percent Passing (by weight) |
| 1 inch | 100 | 100 |
| ¾ inch | 85 – 100 | 90 – 100 |
| ½ inch | 50 – 80 | NA |
| No. 4 | 25 – 45 | 40 – 65 |
| No. 8 | 15 – 30 | 30 – 50 |
| No. 200 | 4 – 10 | 3 – 7 |

2. Type II gravel materials are for uses such as road sub-base. Type II gravel will have a D50 of ¾" with no particle greater than 3 inches in diameter (i.e., 3-inch minus).

3. Type III gravel materials are for uses such as a general gravel barrier in areas other than where Type I or Type II is placed. Type III gravel will have a D50 of 1½ inches with no particle greater than 3 inches in diameter.

4. Con-Ag materials are for uses such as walkways, flower gardens, and parking/driveway surface applications as identified by the IDEQ during the property owner walkthrough. Con-Ag will be a washed 5/8 inch to 3/16 inch, near-round rock material suitable for landscaping applications and should contain no fines. This material should not require metal analysis since it contains no material passing a No. 80 sieve; however, the Contractor must provide documentation from the supplier regarding material characteristics.

5. Washed Gravel materials are for uses such as flower gardens and rock gardens as identified by the IDEQ during the property owner walkthrough. Washed gravel will consist of washed concrete aggregate, uniformly sized at ¾ inches to 3/8 inches, unless otherwise specified by IDEQ, suitable for landscaping applications and should contain no fines. Washed gravel should not require metal analysis since it contains no material passing a No. 80 sieve; however, the Contractor must provide documentation from the supplier regarding material characteristics.

6. Washed ½ inch chip rock gravel materials are for uses such as landscaped areas, flower gardens, and parking/driveway surface applications as identified by the IDEQ during the property owner walkthrough. The ½ inch-gravel will be a washed, fractured/angular material, uniformly sized at ½ inches, unless otherwise specified by IDEQ, suitable for landscaping applications and should contain no fines.

7. 2-inch angular (Avista) gravel materials for uses as indicated by IDEQ during the property owner walkthrough. The Avista gravel will be a fractured/angular material, uniformly sized at ¾ to 2 inches. This material should contain no fines. The Avista gravel should not require metal analysis since it contains no material passing a No. 80 sieve; however, the Contractor must provide documentation from the supplier regarding material characteristics.

*Rock*

Remediated areas where IDEQ determines that larger size material than the gravel is necessary to maintain slope or drainage stability, rock may be placed. Rock gradation analysis will be conducted in accordance with ASTM C117 and C136. Aggregate for rock will not show a loss of more than 30

in the Los Angeles Abrasion Test in accordance with ASTM C131 and C535. There are two types of rock.

1. Type I Rock is 6-inch minus material with a $D_{50}$ of 2 inches.

2. Type II Rock will be 8-inch rock ± 4 inches (i.e., the rock will be 12 inch to 4 inch in size).

*Sand*

Sand materials are for uses such as flower gardens, play areas and recreation areas as identified by the IDEQ during the property owner walkthrough. Sand will be washed, sterilized, dried, screened and contain no organic matter. Sand will have a brown color. Colored sand (e.g., blue or green) will not be accepted. Sand will be classified as non-silica sand of uniform size (No. 30 mesh), unless otherwise specified by IDEQ. Sand material will require metals analysis.

*Bark Mulch and Wood Chips*

Bark mulch and wood chips will be suitable for landscaping application and contain no growth or germination inhibiting factors. Bark mulch and wood chips will allow absorption and percolation of moisture. Bark mulch and wood chips will be derived from 100% virgin wood fiber and not be derived from treated wood.

*Landscaping Rock*

Landscaping rock will be rounded, river rock with a uniform diameter of 1 inch to 2 inches. An alternative is 3/4-inch lava or white landscaping rock.

*Gravel and Rock Quality Control Requirements*

Materials for use as rock and gravel shall be obtained only from subcontractor's source(s), which have been pre-approved by the contractor, including the specific rock type (formations) from which acceptable products can be obtained. Standard gradation to be performed during production for

every 2500 cubic yards produced or twice per day with sand equivalent performed if greater than 5% passing the 200 sieve.

Approval of a source as a borrow area does not mean that all materials excavated from the source will meet the requirements of this section. Processing or selective quarrying, or both, may be necessary to meet the gradation and quality requirements specified.

Materials shall be un-weathered, dense, sound, resistant to abrasion and free from cracks, seams, and other defects as found in field inspections.

Stockpiling of material must be controlled to prevent segregation of material and failure to meet prescribed gradations.

The subcontractor shall monitor materials acquisition and production to ensure that only acceptable materials confirmed by the contractor are processed. During excavation or blasting of material, selection procedures are adequate to prevent inclusion of deleterious materials in processed materials. The contractor reserves the right to inspect and test the materials.

Sampling of aggregates shall be conducted according to ASTM D75-03. The Contractor will obtain production gradation test results from the gravel production sub-contractor. The Contractor will be allowed to use production gradation results and in addition, to ensure that the material has remained in gradation during the stockpiling/windrow process, collect daily gradation samples from the working face in the stockpile/windrow of the material being used for each working day. Below is the sampling methodology and follow up procedures that will be used:

1. The average (Arithmetic Mean) of representative gravel sample analytic results will be used.

2. Samples will be collected from the working face of the windrow/stockpile each working day.
3. All samples collected during a week will be used in the calculation of the average. Contractor may collect samples on a more frequent basis as well.
4. Sample collection and analysis will be conducted in conformance with RDR specifications for the Type I gravels. IDEQ or its representative will be notified prior to samples being collected. IDEQ or its representative will observe the sampling procedures and may request a split of the Contractors sample for gradation analysis.
5. Material gradation specifications to be used as the standard will be those required in the RDR.
6. If the average meets gradation specifications, all properties with gravel placed during the respective dates of sampling will be considered in compliance with the gradation specifications.
7. If the average fails to meet gradation specifications, all properties with gravel placed during the respective dates of sampling will be considered out of compliance until the Contractor further remedies the non-compliant gradation. The follow up remedy will be a mutually agreed upon solution between the Contractor and IDEQ. Depending upon the severity of non-compliance, a remedy may range from a performance evaluation to a complete replacement. Other less active remedies, such as replacement of the top 3 inches, addition of more gravel, and other techniques may be considered. Consideration will be given to such factors as the potential for tracking of fines, the need for binder agents, drainage, settling, compaction, and the "rockiness" of the final surface.

Materials for aggregate base for roads and rights-of-way shall consist of sound, durable rock particles and shall not exceed more than 5 percent deleterious rock and shale by weight.

### 1.3.2 Residential Property

Residential properties designated by the IDEQ and EPA will be sampled at the 0- to 1-, 1- to 6-, 6- to 12- and 12- to 18-inch intervals for determining property areas equaling or exceeding the 700 mg/kg lead or 100 mg/kg arsenic threshold concentrations. Sampling also will include discrete areas of the yard that may be particular exposure sources or reservoirs of contaminants, such as driveways, produce gardens, or specific play areas.

Sampling and analysis will be conducted according to the Sampling and Analysis Plan (Appendix A-2). Residential soil sample results will be provided to the property owners (or their designees) on the plot plan or in a letter. Residential properties will be remediated based on the results of the yard soil sampling. The exact nature of the remediation will be determined on a case-by-case basis. However, a general description of the depths of excavation and application of visual markers, based on sampling results, is described in Appendix C. The following areas may be remediated within each yard:

- Sod areas
- Roadway shoulders (if curb and gutter are not present) to asphalt or pavement and to the lateral extent of property
- Landscaped areas
- Play areas
- Garden areas
- Driveways
- Garages and storage buildings with dirt or gravel floors
- Storage areas with dirt or gravel surfaces
- For hillside areas, the IDEQ will work with the property owner during the property walkthrough to identify areas currently utilized by the residents and those areas that may be used in the near future on the property. In general, remediation of large hillside areas will include only those contiguous areas clearly used in conjunction with the residence; however, the extent of remediation will be determined on a case-by-case basis by IDEQ. Overly steep hillsides are defined as those areas that are so steep as to pose a stability or safety concern if six or twelve inches of material were excavated and backfilled. Overly steep hillsides will, in general, not be excavated. Specific types of overly steep hillside areas are listed as follows with general remediation recommendations:
    - Well vegetated – Will remain as is with no disturbance.

- Sparsely or Unvegetated – To minimize soil migration in areas which are surrounded by developed residential or public use areas, the areas will be seeded with field seed and tackifier then overlain with Turf Reinforcing Material (TRM) to anchor potentially contaminated soils. Prior to this application, a minimal layer of suitable soil may also be applied to give the grass seed a better source of growth material. Areas not surrounded by developed residential or public use will be left as is, generally eco blocks or other retaining wall structures will be employed at the toe of the slope below these steep areas.

- Delineation Between Contaminated and Uncontaminated Areas of Properties – In those overly steep hillside areas where no excavation has occurred and the potential exists for sloughing of contaminated materials, clean areas will be delineated by a row of ecoblocks or other suitable retaining structure at the toe of the slope. These structures will serve to capture contaminated material that migrates to the bottom of the hillside.

For instances where policy issues arise, IDEQ will consult with the EPA.

- For large outlying properties or large residential properties (2 acres and larger), the IDEQ will work with the property owner during the property walkthrough to identify areas utilized by the residents and those areas that may be used in the near future on the property. In general, remediation of large properties will include only those contiguous areas clearly used in conjunction with the residence; however, the extent of remediation will be determined on a case-by-case basis by IDEQ. For instances where policy issues arise, IDEQ will consult with EPA.

- For properties having a retaining wall in poor condition, the IDEQ may determine on a case-by-case basis, for safety reasons, that the prescribed remedy will not extend to the retaining wall. In such situations, this will be indicated on the construction and as-built plot plans to indicate where a remedy was prescribed, but no action was taken. In these cases, the reasons for avoiding the retaining wall will be communicated with the property owner (or designee) during the pre-construction property walk-through. For instances where policy issues arise, IDEQ will consult with EPA.

When a 12 inch remediation is prescribed (results exceeding the 1000 mg/kg lead or 100 mg/kg arsenic action level), the "cut and fill" method may be implemented if existing grade permits and the property owner approves. This scenario requires little or no excavation, but must have a visual marker (barrier cloth) placed on existing soil prior to placing the 12 inch clean soil or gravel backfill. (See Section 5.4 and Appendix C).

Areas immediately associated with the residential properties (i.e., road shoulders and alleys) may not require topsoil, but will require replacement with clean material or a permanent cover.

During the excavation process, all existing soil and coverings will be removed and disposed of at IDEQ approved locations. Larger trees and shrubs will be left in place. After spreading, compaction, and grading, clean fill will be re-vegetated if appropriate. The lawn areas of remediated yards will generally be re-vegetated with sod. Other remediated areas not currently maintained as lawns, such as vacant lots or improved contiguous hillsides, will be stabilized and hydroseeded to achieve a ground-cover level of 85 percent. If preferred by a property owner, hydroseeding could be substituted for sod on a lawn. To the extent practicable, all yard landscaping will be returned to its original condition.

Unpaved driveways and roadways within residential areas will be remediated concurrently with the residential area in accordance with the specifications presented in Section 5 of this RDR.

Produce Gardens

The soil action levels for produce gardens are 700 mg/kg lead and 100 mg/kg arsenic. Produce gardens will be sampled in the 0- to 1-, 1- to 6-, 6- to 12-, 12- to 18-, and 18- to 24-inch intervals. Sampling and analysis will be conducted according to the Sampling and Analysis Plan (Appendix A-2). All produce garden areas in any residential property being remediated must have 24 inches of soil with a lead content less than 700 mg/kg or arsenic concentrations less than 100 mg/kg, or meeting the clean soil specifications of Section 1.3.1. The size of replaced garden area will be the same as the existing garden area unless the property owner agrees to something less. For residential property where no garden area currently exists, a new garden area up to 150 square feet will be established if requested. New or existing garden locations will be identified on the site plans, which will become part of the property record.

The application of visual markers for produce gardens is generally described in Appendix C. The application of visual markers may vary based on site-specific factors.

### 1.3.3 Commercial Property

Commercial properties are divided into two categories. **Type I** commercial properties are accessible to the sensitive populations and/or have unrestricted access. Typical Type I commercial properties include daycare facilities, parks and playgrounds. **Type II** commercial properties are inaccessible to residential areas or sensitive populations.

Samples will be analyzed for lead and arsenic concentration in accordance with the Sampling and Analysis Plan (Appendix A-2). Sampling results and property classification will be used to determine remedial action for individual commercial property (See Appendix C).

The Type I commercial property with lead and arsenic concentrations above the soil action levels will receive a remedy consistent with residential property. Commercial parking areas that are unpaved may have an option of an asphalt cap as opposed to gravel replacement. If the cost of asphalt is greater than gravel remediation, the business owner has the option to pay the difference to receive the asphalt remedy. Heavily used areas may require extra asphalt thickness, and any additional costs beyond the normal gravel replacement will be absorbed by the business owner.

A Type II commercial property remedy may be to install a fence (or other barrier) to restrict access or a six inch gravel/soil placement with barrier cloth as determined by IDEQ. Excavation may be necessary for the installation of the Type II barrier to maintain grade or drainage. Visual markers will be placed as necessary (see Section 5.4 and Appendix C).

Areas immediately adjacent to residential properties (i.e., road shoulders and alleys) may not require topsoil, but will require replacement with clean material or a permanent cover.

### 1.3.4 Rights-of-Way

Rights-of-way (ROW) are divided into three categories. A Type I ROW is located adjacent to residential property or Type I commercial property. Type II ROW is located adjacent to Type II commercial property or in an undeveloped area. Type III ROW is located where access is restricted. The restriction can be from physical barriers (e.g., fences), or legal statute (e.g., Interstate 90 corridor). Rights-of-way may be owned by local governments (city or county), the State, or other entity.

Rights-of-way adjacent to residences will be sampled in a manner consistent with the residential property protocol (See Appendix A-2). Other rights-of-way will be sampled at the 0- to 1-inch, 1- to 6-inch, and 6- to 12-inch interval, according to Type II commercial protocol in the Sampling Analysis Plan. Samples will be analyzed in accordance with the Sampling and Analysis Plan (Appendix A-2). Sampling results and property classification will be used to determine remedial action for individual ROWs (See Appendix C).

In general, residential area rights-of-way will be remediated along with residential properties. Non-Residential area rights-of-way will be remediated along with the adjacent property. In some cases, IDEQ may choose to conduct remediation in rights-of-way separate from the adjacent properties in order to address drainage issues or other construction issues.

If not access-restricted, the rights-of-way will receive a 6-inch barrier, at a minimum. For commercial area rights-of-way where access is restricted and the vegetative cover is 85% or greater,

no additional action is necessary. If access is restricted but the vegetative cover is less than 85%, then additional vegetation will be placed.

Barriers will consist of rock where the land use dictates the need for more durability. Portland cement concrete pavement or an asphalt pavement may be placed at the discretion of the IDEQ and in consultation with the property owner. In general, unpaved roads will be replaced with clean gravel and paved roads will be replaced with new pavement. The thickness of pavement will be consistent with city and county specifications. If requested by the owner, existing gravel roads may be replaced with pavement at the discretion of IDEQ. In these cases, IDEQ and the property owner will sign the asphalt agreement included in Appendix I. Re-vegetation will occur on a case-by-case basis. Seeding or sod application over clean soil barriers or direct seeding of existing soil will occur as directed.

Access controls may be used at the discretion of the IDEQ, and through coordination with EPA, for areas that do not pose a threat due to wind or water transport, or tracking by vehicles or pedestrians. The installation of access controls in ROWs may occur in areas that do not pose a threat from wind or water transport, or from tracking by vehicles and pedestrians. At the discretion of the IDEQ and in consultation with the property owner, access controls in ROWs may also be used to reduce the required thickness of barriers. This will also restrict access by the public. Access control design for ROWs will be undertaken on a case-by-case basis and will be consistent with the requirements of the property owner or regulating agencies. The property owner will be informed by IDEQ of the potential negative impacts of installing access controls to minimize remediation. Potential negative impacts may include increased operation and maintenance activities, decreased land use alternative uses, and potential property value effects.

### 1.3.5 Private Domestic Water Supply

During soil sampling activities, IDEQ or their designee will also conduct sampling of private drinking water wells. Wells identified as having metal concentrations greater than the identified standards (i.e., water having greater than 10 ug/L arsenic, 5 ug/L cadmium, or 15 ug/L lead) will be closed and an alternative water supply established. Well closure/abandonment will be conducted in accordance with IDAPA 37, Title 03, Chapter 09 "Well Construction Standard Rules," Rule 25 "Construction of Cold Water Wells," Chapter 12 "Abandoning of Wells" of the State of Idaho as administered by the Idaho Department of Water Resources (IDWR). Alternative water supply establishment may include:

- Connection to an existing water supply system
- Point-of-source treatment
- Installation of a new well in a suitable aquifer
- Other appropriate measure.

For residences that have private domestic water supply wells that will be closed, the IDEQ Project Coordinator or designated representative will ask the property owner for well completion details and if there is a secondary water supply source (see well questionnaire in Appendix I). Information regarding potential site-specific problems associated with well access will also be requested and identified. This may be accomplished during the pre-remediation site walk through (see Section 3.2).

# 2.0 TECHNICAL ANALYSIS

Based on experience within the Box, emergency removal actions undertaken in the Basin since 1997, and remediation activities in the Basin since 2002, the remedial designs outlined in this RDR for residential and commercial property, for rights-of-way and private domestic water supplies provide protection of human health through installation of clean barriers between people and soil above the action level and providing clean drinking water to site residents. The designs also address exposure concerns through direct contact with soil above the action level or tracking of soil above the action level into residences as a source of lead in house dust. In combination with other programs to monitor house dust in residences where children reside, remedies described in this RDR have a demonstrated ability to meet the performance objectives. Additional technical analysis is not required in this document.

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# 3.0 DESIGN

A detailed remediation plan for each property will be prepared on a case-by-case basis. The procedure for plan preparation is outlined below. A separate plan will be prepared for water well closure and establishment of an alternative water supply, on a case-by-case basis.

## 3.1 SITE ASSESSMENT AND SELECTION

Basin properties selected for remediation will meet the following criteria:

1. Remediation will be performed at the discretion of IDEQ and EPA. The remedial action work will be prioritized on high-risk property, logical construction sequencing in blocks, and other target areas identified from sampling events. High-risk residential property determination is in Appendix D. The EPA and IDEQ will designate the majority of properties to be remediated prior to the start of the construction season, based on available sampling information. During the course of the season, other properties may be sampled and remediated in order to meet the goal of prioritizing high risk properties and logical construction sequencing. The construction season is typically considered to be from April 15 to November 1, barring unusual weather. It is expected that the Contractor will complete property remediation activities within 6 to 9 working days per property (from start of excavation to completion site inspection), excluding punch list, lawn maintenance and warranty activities. Work will be performed during daylight hours, typically 7 am to 6 pm Monday through Thursday, and as directed by the IDEQ Project Coordinator, or designated representative. Construction activities will be coordinated with the IDEQ Project Coordinator or designated representative, and private property owners. The Contractor will limit the duration of time that a property is open.

2. The property owner (or designated representative, if applicable), will have signed an access agreement that allows representatives of EPA, IDEQ, Panhandle Health District (PHD), Contractor, and their designated representatives access for entry, sampling, removal of lead-bearing materials from the property, well closure and alternative water supply establishment, and other activities conducted during the remediation process. The IDEQ or their designee will initiate completion of the property owner agreements. The agreement will also provide for access for barrier maintenance and inspection activities through the following construction season for warranty work. Access for EPA and IDEQ for future audits to evaluate barrier integrity is also addressed in the access agreement. Appendix E shows a typical access agreement.

3. Property will be selected for soil remediation on the basis of property soils equal to or exceeding the 700 mg/kg lead, 1000 mg/kg lead, or 100 mg/kg arsenic remediation action levels as discussed in Section 1.3.2 or the 1000 mg/kg lead or 100 mg/kg arsenic commercial and rights-of-way remediation action level as discussed in Section 1.3.3 and 1.3.4, respectively. Sampling will be conducted on a block-by-block basis, or as determined by the EPA and IDEQ, as outlined in the SAP (Appendix A-2). If the lead levels are greater than or equal to 900 mg/kg and less than 1000 mg/kg, IDEQ will automatically resample the property if lead drives the remediation. If arsenic levels are greater than or equal to 60 mg/kg and less than 100 mg/kg, IDEQ will automatically resample the property if arsenic drives the remediation. Results of the resample will be used to determine eligibility for remediation. This is part of the sampling QA/QC program. Note: Remedy determinations may be made without resampling as approved by IDEQ.

4. Property will be selected for water well closure and establishment of an alternative water supply on the basis of private domestic water supply wells having concentrations of metals of concern equal to or exceeding 10 ug/L arsenic, 5 ug/L cadmium, or 15 ug/L lead, as discussed in Section 1.3.5. Sampling will be conducted for residences having private domestic water supply wells, or as determined by the EPA and IDEQ, as outlined in the SAP (Appendix A-2).

## 3.2 PROPERTY OWNER AGREEMENT

The agreement among the property owner(s), Contractors, and IDEQ, including the Remediation Access Agreement, will be completed prior to starting remediation activities. The IDEQ or their designee will initiate completion of the property owner agreement. For rights-of-way, property owners may include the State of Idaho, local governments (city or county), utility companies, etc. For rights-of-way, it is assumed that a single comprehensive remediation access agreement will be obtained from each major owner (e.g., local governments and utilities) that will apply for the duration of construction work. Separate access agreements will not be necessary for right-of-way work conducted concurrently with commercial and residential properties (e.g., boulevards, road shoulders, and alleys). Separate agreements for well closure and establishment of an alternative water supply may be made, if deemed necessary and appropriate by IDEQ. Site-specific features for

each property will be identified and agreed upon by the above-mentioned parties and will include the following:

- Excavation limits (shown on the construction plot plan).
- Trees and/or shrubs to be removed and to remain, (shown on the construction plot plan).
- Cultural features to be removed by the owner or tenant(s) (shown on the construction plot plan).
- Cultural features to be removed by the contractor. If survey markers or property boundary markers need to be moved, they must be surveyed prior to removal and placed utilizing survey equipment by a licensed professional land surveyor (shown on the construction plot plan if observed).
- Produce garden areas requiring deeper excavation depths (up to 24 inches), the designation of an elevated garden area to reduce excavation, the location of a new garden area (if not previously existing), and any special soil characteristic concerns (shown on the construction plot plan).
- Limits of non-paved driveways to be remediated (shown on the construction plot plan).
- Identification of utilities and subsurface obstacles (e.g., septic systems, survey monuments, and sprinkler systems) that may be in the way of the remediation efforts.
- Identification of ground-level windows and window wells.
- Identification of deteriorated features and their replacement, as necessary.
- Special items of concern collectively agreed upon by the Contractor, EPA, and/or IDEQ and the property owners.
- For commercial property, the property owners will have the opportunity to provide information on the use of the property during the initial and pre-remediation walkthroughs. Property use will help determine the type of barrier installed on the property. Barrier durability for the intended property use is the key component in barrier selection. If the property owner desires to upgrade the barrier, the owner will be responsible to pay for the additional costs.

Basin properties that have been selected and for which an access agreement has been completed will be scheduled for remediation. Once agreements are completed the work will be scheduled, where possible, groups of residential and commercial properties located within the same vicinity (e.g., street and community) will be scheduled concurrently. Scheduling groups of properties together for remediation is necessary to limit disruption of a community from trucks traveling through the streets, and their associated safety and air quality concerns.

## 3.3 UTILITY LOCATIONS AND PERMITS

The Contractor will arrange with the local utility companies to visit each scheduled property and locate all utilities (e.g., electrical, water, sewer, gas, cable, and phone lines). The Shoshone County One Call (1-800-398-3285) requires a minimum of 48 hours to allow ground marking the property before the Contractor commences excavation activities (The nearest cross street needs to be provided to the locating service during the locate request). Documentation of utility locates shall be made available to IDEQ upon request. The Contractor will scan each property for visible obstacles, and may utilize an electro-magnetic detector if there is reason to suspect buried obstructions have not been marked (i.e., survey monuments, sprinkler systems). The property owner will be notified by the Contractor of this site visit and may be asked to provide information on subsurface obstacles such as septic systems and abandoned lines. Locations of subsurface obstacles will be confirmed by the Contractor hand digging to trace the orientation of the obstacle and to mark it adequately with spray paint.

Work conducted under CERCLA authority doesn't require permits, but does need to comply with substantive requirements of the permit. The Contractor is responsible for meeting the substantive requirements of all laws and regulations applicable to performing remediation work on the site.

## 3.4 SITE PLAN & VIDEO DOCUMENTATION

The IDEQ or their designee will develop construction plot plans for each property being remediated. Construction plot plans will record all site-specific items identified in the access agreements, and remedy negotiation. The construction plot plan will identify areas for remediation, known caution zones with subsurface obstacles, and other residential property remediation information as necessary. The construction plot plan will record each residence's planned remediation, including the following:

- Total depth of soils, gravel, and sod excavated on each site, including cross sections when necessary.
- Conditions of the existing yard including drainage characteristics and problems, structures on the property, and placement of cultural items, to the extent possible.
- Fences, approximate property boundary, and demarcation stakes.
- Special instructions for field work crews, such as produce garden areas where more than 12 inches of soil are to be removed.
- Need for and placement locations of visual markers to be placed under clean barriers.
- Limits of excavation.
- Trees, shrubs, plants and landscaping to remain or be removed and replaced.
- Barrier enhancement “greening” areas.

The construction plot plans portray the general areas to be remediated and the depths of removal/replacement. Properties have not been surveyed, so property boundaries are estimated (approximate). Measurements (dimensions) are hand-taped and depict horizontal projections, so do not necessarily account for slope. These plot plans are not engineered drawings; information and locations shown are considered approximate.

The construction plot plan will be used as a record for remediation activities conducted at each property. The property owner, Contractor, and IDEQ representative will sign the construction plot plan before work is commenced to signify acceptance by all parties. The construction plot plan will be marked up in the field during construction to show the actual work performed. Following completion of remediation activities, excluding lawn maintenance and warranty work, the parties will sign the Work Completion Sign-off section of the Access Agreement. A record drawing will be created for each property from the marked up construction plot plan prior to final sign-off by IDEQ.

Video documentation will be used to document pre-remediation and post-remediation conditions of the property, structures, streets, alleys, vegetation, and side walks. In the event a dispute arises between the Contractor or the IDEQ and property owners, the video documentation will be used to resolve any claims. The video documentation will become a part of the permanent record for each property.

The record drawing and video documentation will be incorporated into the property record. In addition, a copy of the record drawing will be provided to the property owner.

## 3.5 ATTEND MEETINGS

The Contractor will attend a pre-construction meeting with IDEQ prior to initiating on-site work. The date, time and place of this meeting will be agreed upon by IDEQ and the Contractor. The Contractor will attend a quality control meeting with IDEQ prior to initiating on-site work to discuss the Contractor's Quality Control Plan (see Section 12.1.2). The date, time and place of this meeting will be agreed upon by IDEQ and the Contractor. These meetings may be combined at the discretion of IDEQ. During the pre-construction and quality control meeting, the IDEQ will review their expectation of contractor performance.

The Contractor will attend weekly progress meetings with IDEQ. The date, time, and place of these meetings will be agreed upon by IDEQ and the Contractor (The generic meeting agenda and contractor submittal for the weekly meeting is included in Appendix I). The purpose of the weekly meeting is to allow participants to provide a status update of progress, identify and resolve issues, and conduct necessary planning and scheduling activities.

The contractor will attend at least two on-site meetings per property, as described below. The date, time, and place of these meetings will be agreed upon by IDEQ and the Contractor.

1) The pre-construction walkthrough will provide the Contractor with an opportunity to identify existing site conditions that will be documented by IDEQ. The Contractor, at this time, will identify health and safety concerns associated with the property and remediation plans. A site specific health and safety plan will be filled out for each property. Scope and Schedule will also be discussed at this time. IDEQ will provide the construction plot plan signed by all parties that will serve as a property specific scope of work for the remedial actions. During this meeting the parties will identify remediation limits that may be modified. Limits may change due to:
    - Concerns identified by the owner, contractor, or IDEQ representative, (e.g., structural stability of buildings and walls, or slope stability)
    - Necessary excavation to tie into previously remediated property
    - Other information obtained indicating a need to change the remediation limits.

For situations where remediation limits are changed, the changes will be marked on the construction plot plan and the owner, contractor, and IDEQ will initial and date these changes.

2) A post-remediation walkthrough (a remediation completion site inspection) is required to:
    - Determine satisfactory completion of work
    - Identify concerns or damages caused during remedial work

- Develop a work-required punch list. The punch list must be completed and approved by IDEQ, or a designated representative prior to final payment (see Section 10.1).

Meetings involving scheduling, disputes or other issues arising during the construction or warranty period may also occur.

All construction activities will be coordinated with the IDEQ and the property owners. Coordination with IDEQ is necessary to allow timely inspection of excavation depths, back fill, and sod installation. The Contractor will not proceed with the next step until IDEQ or their representative inspects and approves the previous step. Coordination with owners or their designated representatives is necessary to keep them informed of what is occurring on the property.

# 4.0 PROPERTY PREPARATION

As part of the property preparation activity, the Contractor will provide a final notification to the property owner(s) and IDEQ of the intended action, date, and start time. For rights-of-way, property owners may include the State of Idaho, local governments (city or county) and/or utilities. The Contractor will make this notification to the extent practicable at least five days prior to the start of on-site activities, unless special circumstances dictate a shortened timeline. The property owner(s) will be asked to discuss any concerns or special requests they may have in removing surface obstacles or in preparing their property for remediation. The Contractor will request that the property owner(s) remove and store any obstacles prior to performing remediation work. The Contractor may be asked to assist the owner in moving these items by IDEQ or their designated representative. These obstacles may include personal possessions and keepsakes requiring special care, woodpiles, walkway stepping stones and other miscellaneous landscape articles, equipment, or material stockpiles. Debris and trash are to be removed by the property owner unless otherwise agreed upon during the pre-remediation walkthrough. The property owner and Contractor will relocate these items on-site where possible and as necessary. The property owner is responsible for removing all used tires from the areas being remediated. The responsibilities and schedule will be determined during the pre-remediation walkthrough. If garages and storage buildings have earthen floors needing remediation, the building floors will need to be cleared of obstacles by the owner prior to remediation. Fences, gates, decks and porches will be removed, if necessary, to allow for equipment and work crew access to the underlying soil. The property owner will relocate large possessions, such as RVs, boats, machinery, vehicles, or stockpiles of material. If necessary, a storage area will be provided by the Contractor. In special cases, where the property owner is physically unable, the Contractor will transport possessions for the property owner. This will be determined during the pre-remediation walkthrough.

The Contractor will restore all features that were temporarily relocated or removed to their original location and condition or as determined during the pre-remediation walkthrough. As necessary, the Contractor will replace features with similar items in accordance with industry practices or matching quality of existing items as originally placed. This does not preclude the use of used materials. Agreement between the IDEQ and property owner will be made on the use of proposed replacement materials prior to installation.

# 5.0 GENERAL CONSTRUCTION WORK

With the exception of the "High Risk Program" defined in Appendix D, properties will be remediated on an area-by-area basis, to the extent practical. Prior to each construction season, a work plan will be prepared outlining those areas to be remediated that season (see Section 12.3).

## 5.1 EXCAVATION ACTIVITIES

Excavation involves the removal of contaminated soil, sod, and gravel from selected properties in the Basin as described herein. The intent of excavation activities is to remove contaminated soil, sod and gravel that present a health risk and to allow the installation of a protective barrier against underlying contaminants. All native material will be considered contaminated. Excavation limits will be determined on the construction plot plan. In general, excavation will be completed to allow the placement of 6-inch, 12-inch and 24-inch clean soil barriers (excluding grass cover) as identified for each individual property. During on-site activities, the Contractor will provide clean access to the property for the residents (refer to Section 6.4).

The Contractor will determine the appropriate equipment for excavation activities. The Contractor will consider and provide an appropriate balance of equipment and labor to excavate material without damaging existing features on the property (e.g., structures and trees). The Contractor will exercise extra caution when working around structures and trees (see Section 5.2).

Some excavation areas will require the use of tracked equipment and possible placement of a geotextile fabric (not the same as a visual barrier cloth). These situations typically occur in saturated soil conditions. IDEQ or a designated representative will determine if placement of a geotextile is necessary.

The geotextile shall be a nonwoven, needle punched sheet consisting of polypropylene fibers. The geotextile shall be non-biodegradable and resistant to naturally occurring chemicals, alkalis and acids. The geotextile will meet the following minimum specifications:

- Weight = 12 ounces/square yard (ASTM D5261)
- Thickness = 130 mils (ASTM D5199)
- Grab Strength = 310 pounds (ASTM D4632)
- Trapezoid Tear = 120 pounds (ASTM D4533)
- Puncture Strength = 180 pounds (ASTM D4833)
- Mullen Burst Strength = 650 pounds (ASTM 3786)
- Apparent Opening Size = 0.15mm (ASTM 4751)
- Ultraviolet Degradation = 80% retained at 500 hours ASTM 4355)

The Contractor will submit to IDEQ material specifications, descriptions and other documentation, including sources, to demonstrate compliance. The Contractor will also provide material samples, when requested by IDEQ or a designated representative, to allow independent analysis and testing. Samples will be at least 1.0 square foot for each type of material and will be tagged with the name of the source. Deliver each roll with sufficient information attached to identify it for inventory and quality control. Handle products in a manner that prevents damage.

The geotextile panels will be continuously overlapped a minimum of 18 inches. The Contractor will protect the geotextile during storage, handling and installation.

The geotextile is not the same material as the visual marker identified in Section 5.4.

If the Contractor uncovers unknown artifacts or materials of any kind, they will follow the procedures identified in Section 5.3. Differing site conditions impacting the schedule and/or cost of property remediation will be immediately presented to IDEQ and the property owner(s). The

Contractor will not interrupt existing subsurface sewers or other structures without authorization from the IDEQ Project Coordinator or designated representative. Excavation beneath buildings or pavement will not be conducted.

The Contractor will repair and restore damage to structures, utilities, or other features on the property caused during remediation. The features will be repaired and restored to their original condition. In the case of damage to a utility, the Contractor will report the damage immediately and service will be properly restored as soon as possible. Refer also to Section 10.2.

Where necessary and appropriate, ingress areas for heavy equipment travel will be secured. This will include placement of adequate material on sidewalks, curbs, gutters, pavements, or other heavy traffic areas to protect them from damage during remediation work.

Equipment will not traverse, or operate within 1 foot of structures or within the dripline of retained trees. First-stage cuts will be taken in a down and away fashion at least 1 foot from buildings, or other structures, foundations, and exterior walls. First-stage cuts will be taken at the edge of the dripline for retained trees. This method will allow soil and sod to be removed easily from lawn edges by hand and will expedite the careful removal of material close to buildings, other structures, and around tree root systems.

Equipment will make the second-stage excavation cuts, including large open areas of existing lawns. Crews will pile sod and soils removed from hand-digging removal operations into central locations for loading into dump trucks. The pre-defined egress areas will be nearest the street for loading soils into dump trucks. Operation of heavy equipment will be conducted in a manner that avoids tracking contaminated soils through clean areas and off-site.

Work crews will utilize procedures that will not result in damage to buildings, structures, trafficways, or vegetation. Spotters will monitor the zones of heavy equipment operations at all times. Hand signals and communication plans for equipment operators and work crews will be developed and used. Excavated material will be loaded directly onto trucks for disposal whenever possible and will not be stockpiled on-site overnight. Every effort will be made to remove stockpiled material by the end of the work day. If stockpiles cannot be removed they should be flattened out or sufficiently tarped prior to the end of the day. Excavation and material transport will be conducted to eliminate the need for stockpiling contaminated materials.

Sod and soil will be removed so that the specified thickness of barrier, at a minimum, can be placed on the property per the requirements in Appendix C. This may require over-excavation to allow the installation of the required clean soil barrier to protect human health. Sod can be assumed to be 1 inch thick. The Contractor will make every effort to attempt to schedule excavation work so the removal of material from around retained trees is conducted immediately prior to fill placement. The Contractor will coordinate with IDEQ or their designated representative to allow verification of the excavation depth prior to visual marker and backfill placement.

Plants that are to be removed will be clearly identified during the pre-remediation walkthrough and marked on the construction plot plan prepared by the IDEQ. These may include stumps, dead or dying trees (if owner cuts down), and shrubs. Care will be taken by the Contractor to not damage the retained trees when removing stumps, brush, or soil. Plant waste, excluding sod, will be separated from soil waste. Plant waste will not necessarily be disposed at the same location as soil waste. Tree waste may be chipped and recycled.

In cases where a six inch removal is recommended and conducted, the IDEQ or designated representative and the Contractor will inspect the excavated surface for obvious tailings deposits or visually identifiable hot spots. Identified tailings will then be removed to a depth of 12 inches. If

visible tailings are still observed at 12 inches, a visual marker will be placed before backfill occurs. This may be conducted for residential properties, Type I commercial properties or Type I ROWs.

Decontamination of equipment and personnel is required for activities conducted during property remediation that involve contact with contaminated soils (refer to Section 6.3).

## 5.2 PROTECTION OF PROPERTY

The Contractor will protect all parts of the property where work is performed and adjacent properties, including buildings, other structures, benchmarks, fences, sidewalks, curbs, and retained plants. The Contractor will protect all vegetation on the property, including plants in flowerbeds and gardens, as identified during the pre-remediation walkthrough or otherwise directed by the IDEQ. Work will be performed in a manner appropriate for the area, whether residential, commercial or rights-of-way.

The Contractor will inspect large tree roots, paved roadways and driveways, concrete sidewalks, foundations, and structures during excavation operations, and will take immediate appropriate steps if damage has occurred. Hand digging will be required for all areas susceptible to potential damage from heavy equipment operations, as discussed in Section 5.1 and 5.5.

Structures and buildings will be inspected by the Contractor and IDEQ for evidence of damage or changes to existing conditions as documented in the construction plot plan and in photographs or video documentation from the pre-remediation walkthrough. The Contractor will contact the property owner(s) immediately if damage has occurred to the property.

Damage to retained trees occurs from physically wounding the tree directly or indirectly through altering the environment in which the tree exists. Pruning lower branches and *restricting equipment*

*operation near trees* can minimize physical damage to trees. Care will be taken when pruning. When pruning, the Contractor will keep in mind how the tree will appear after the branches are removed. Consultation with IDEQ and property owner may be necessary. Trees that are to be retained will be pruned to remove low hanging limbs and branches that may be damaged by or interfere with remediation activities conducted on the property. Painting with tree-wound compound may not be required. Artificial shapes of trees are to be avoided.

Tree roots are generally shallow (less than 12 inches below the ground surface) and can extend beyond the drip zone of the tree. The essential roots are usually located within the tree's drip zone. Roots will spread where soil conditions provide moisture, aeration and nutrients. Compaction and grading changes are common causes of root damage during remediation activities. Compaction bruises roots, decreases necessary air spaces reducing oxygen needed by the roots, and can restrict water from getting to the roots. To minimize compaction, machinery (e.g., skid-steered loaders and dump trucks) will not be driven within the tree drip-line and only minimally operated within 10 feet the trunk. Also, construction material or other items will not be stockpiled or stored around trees.

The Contractor will not use machinery to remove soil within 1 foot of building foundations, sidewalks, driveways, streets, alleys, and rights-of-way. Hand digging within 1 foot of these areas is required to minimize potential damage from heavy construction equipment. Unless otherwise directed, soil removal at interfaces with foundations, septic systems, streets, alleys and rights-of-way will extend at a 45 degree angle down to the removal depth, away from the feature. Based on existing site conditions for sidewalks, driveways, and on a case-by-case basis, IDEQ or their representative may direct the Contractor to perform a 90 degree vertical cut along these features. Where 45 degree cuts are made; the Contractor will remove 2 inches of surface material immediately adjacent to the edge of the feature and then make a 45 degree cut down to the excavation depth. Removals adjacent to unsupported or poor foundations, retaining walls, and other features will be avoided. The extent of excavation in these situations will be discussed during the pre-remediation walkthrough, during

excavation activities in the immediate area or as necessary with the IDEQ or his designated representative.

Other handwork of soils will be required in the following areas:

- Around fences left in place
- Underneath existing structures
- From around plants and trees being left in place
- In confined areas where heavy excavation equipment will not be able to maneuver or reach adequately.

Handwork of soil will be limited to areas near buildings, sidewalks, impassable permanent obstacles such as shrubs and tree thickets, and in limited access areas.

The contaminated soil around retained trees will be excavated in a manner that minimizes potential damage to the tree and its root system. Hand digging is required around tree roots to remove as much contaminated soil as possible. The root bulb must be left intact. Excavation of soil with machinery can be conducted at a distance of 10 feet or more from the trunk, maintaining the dripline restriction. The soil will be removed in an outwardly radiating pattern from the trunk. Hand digging is required within 10 feet of the trunk or drip zone, whichever is larger. Digging by hand will also be conducted in an outwardly radiating pattern. Care will be taken to prevent jarring or injuring the tree's root system. Soil is to be removed by digging down and away from the tree, not by digging beneath or between the roots. Damaged roots will be immediately cut with a sharp tool to produce a clean cut. During excavation activities the Contractor will immediately water and cover the roots with moist burlap or clean soil to reduce the chances of drying or injury to the roots. The burlap or soil will be kept moist until clean soil backfill is placed around the trees. The Contractor will apply water to retained trees throughout the process of construction activities. The homeowner may be asked to assist with tree irrigation on the days the Contractor is not working. Run-off and ponding will be avoided. Slow deep watering is necessary to ensure survival of the trees.

### 5.2.1 Survey Monuments

The Contractor shall retain and protect all survey monuments. Monuments, reference monuments or accessories to corners that are disturbed during construction shall be reestablished and remonumented by, or under the direction of, a professional land surveyor per Idaho Statue 55-1613 at the Contractor's expense.

The Contractor shall review the "Survey Monument Reference Sheet" that is available from the Project Representative. The "Survey Monument Reference Sheet" shows survey monuments that are known to exist based on a record of survey search and a field verification conducted by, or under the direction of a P.L.S. The monuments shown on the Survey Monument Reference Sheet (if any) are identified from a record of survey search conducted by a P.L.S. designated by IDEQ using mining claims, department of lands information, United States General Land Office (GLO), and survey records at the County Courthouse. During the research phase, the P.L.S. notes the marker location, type, and identification on a tracking spreadsheet and on a draft plot plan. Following the records search, the PLS conducts a field search to verify if the monuments identified during the records search exist. Monuments that are found by the PLS during the field search are marked with survey flagging or similar such that the Contractor can locate the monuments at the time of construction and provide adequate protection of the monuments. Distances from fixed objects to the monuments are provided on the Survey Monument Reference Sheet to assist in located the monuments.

Only monuments that are in the proximity of areas where remedial actions are identified to occur are identified in the field. Monuments that are not in the proximity of the remedial action are not identified.

## 5.3 TEMPORARY WORK STOPPAGES

If conditions are encountered beyond the control of the Contractor that delay or prevent the performance of the on-site activities, the Contractor will stop work at the property and immediately inform the property owner(s), IDEQ Project Representative, and IDEQ Project Coordinator. These conditions include but are not limited to the following:

- Uncovering artifacts that may be of cultural, historic or archeological significance
- Uncovering of artesian wells or groundwater flow
- Building or structural impairments
- Unknown utilities or subsurface features such as mine shafts or abandoned septic systems, which could cause health and safety concerns
- Conditions unknown and beyond the control of the Contractor.

The Contractor will cease work on that property until the IDEQ Project Coordinator has made a determination on a course of action regarding the nature, significance and extent of conditions encountered. For artifacts, this may include a decision to preserve the items or allow for their removal.

## 5.4 VISUAL MARKER APPLICATION

A visual marker will consist of a permanent, woven, water permeable geotextile with performance characteristics equivalent to the following products:

- Polyjute® open weave
- Mirafi® filterweave
- Propex® actiongro

The Contractor will submit to IDEQ material specifications, descriptions and other documentation of the materials, and sources of materials, to demonstrate compliance with the specifications. The

Contractor will also provide material samples, when requested by the IDEQ to allow for independent analysis and testing when the IDEQ elects to do so. Samples will be 1.0 square foot for each type of material and will be tagged with the name of the source.

The visual marker will not inhibit plant growth and will not raise the water table on the property on which it is placed. The visual marker will be stored in a manner to protect it from damage. Operation of machinery on the visual marker will be avoided. Where more than one piece or section is necessary, the visual marker will have at least a 1-foot overlap.

Once excavation is completed, the visual marker will be placed over the subgrade. At the time of installation, the cloth will be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, storage, or placement. Visual review of the cloth will be performed once it has been placed and prior to placement of any overlying materials. Operation of machinery directly on the visual barrier cloth will be avoided. When placing material over joints, place in the direction from the overlying cloth to the underlying cloth. Prevent puncture, tear, or displacement of the visual barrier cloth and protect it from damage. Repair torn areas and holes by placing an overlay of the cloth having dimensions at least 2 feet greater than the tear or hole.

The erosion control fabric or other suitable visual marker material will be placed as necessary to indicate that soil contaminated with a lead content greater than or equal to 1000 mg/kg is below the marker. Visual marker may also be placed, as specified, on the ground surface where no excavation occurs, but a clean 12-inch cap will be added to the existing surface. The marker fabric will be cut/split for placement around tree roots that were exposed during excavation activities. The fabric will be placed directly on the soil surface so it does not create air pockets, around the tree's roots. Specific locations for visual marker placement are described in Appendix C. There may be some variation in visual marker placement based on site-specific factors.

## 5.5 FILL OPERATIONS

Residential Properties

Backfill activities at each property will involve the placement of clean topsoil, gravel and rock in the area of the excavation. The Contractor, in consultation with IDEQ, will determine appropriate equipment necessary to accomplish fill operations. Fill will not be placed over wet, frozen or spongy subgrade surfaces. Where indicated on the construction plot plan or as directed by the IDEQ, a visual marker fabric will be placed prior to back fill placement (refer to Section 5.4). The Contractor will maintain current general drainage as a smooth transition into existing drainage outside the project area and drain away from existing buildings and structures, where possible.

The Contractor will remove all excess material from the property during the last phase of on-site excavation and backfill work. Additional fill (e.g., settlement around trees) will be added prior to the Remediation Completion Site Inspection (refer to Section 10.1).

Stumps, trees, rubbish, vegetation, frozen lumps, or other unsuitable materials will not be used as backfill material. Fill material will be placed to the depths identified on construction plot plans, or as directed by the IDEQ.

The placement of jute netting (mat) may be necessary after completing backfill operations to minimize erosion and assist vegetation growth. The jute mat will be a single net straw blanket or similar product with a longevity of 12 months and applicable for use on 4:1 to 3:1 slopes. The jute mat will be of uniform, open, plain weave, undyed and unbleached single jute yarn. The yarn will be loosely twisted. The jute mat will be furnished in rolls. Placement will be in accordance with manufacturer's instructions. The use of staples or other means may be necessary to hold the mat in place.

Commercial Properties

A clean soil barrier with vegetative cover may be installed on commercial property designated as having none to very light vehicle traffic. Storage areas are an example. A rock or asphalt barrier may be installed on commercial property designated as having light to heavy vehicle traffic. The Contractor will take all precautions necessary to limit the mixing of rock with base material.

A clean soil barrier with vegetative cover may be installed on commercial property having light to moderate pedestrian traffic. Moderate to heavy pedestrian traffic areas may receive either a clean soil barrier with vegetative cover or gravel barrier.

Rock barriers are appropriate where surface conditions are not amenable to vegetation. Typically this would include parking areas and storage areas.

ROWs

The preexisting general drainage pattern will be maintained where possible. In some cases, drainage may improve as a result of the remediation work. If improved drainage is necessary to protect the installed barrier, drainage features will be modified.

Soil barriers with vegetative covers will typically be placed on medians, grass shoulders, city street shoulders, and alley shoulders that are being addressed as part of the remediation of residential or commercial areas. This may also include utility corridors. However, utility corridors will typically be remediated consistent with the adjacent property.

Gravel and rock barriers are appropriate where:

- Surface conditions are not amenable to vegetation
- A more durable barrier is necessary
- Vegetation may create a visibility problem

- Augment drainage conditions
- Steep sloped areas
- Vegetation may create a fire danger.

Typically this will include areas that were gravel or rock (e.g., secondary or access roads having gravel or rock shoulders and gravel or rock road surfaces) prior to remediation.

5.5.1 Rough and Intermediate Grading Procedures

Rough grading is the first phase of the restoration of each property. Clean topsoil will be trucked to the site and will be placed in the area which will eventually receive sod or grass seed. Contractors will avoid driving on contaminated material to minimize tracking and cross contamination. Placement methods that do not disturb or damage other work or physical features on the property will be used. Clean material will be dumped on the property and spread with a machine or by hand. Initial soil grading can be conducted with small, motorized tracked equipment. Hand raking is required to place backfill soil around trees and structures. To the extent possible and practical, the property will be returned to the original surface. The general drainage pattern will include a gently sloped ground surface away from structures (e.g., house, building, and garage).

Trucks will avoid driving on contaminated soils. If driving on contaminated soil cannot be avoided, trucks will be decontaminated as described in Section 6.3. Where access is limited, dump trucks will dump their load in a staging area on the property from which the backfill equipment can transport the material to areas of the property. Some handwork performed by laborers using wheelbarrows and shovels may be necessary to rough-grade the property, especially around structures and retained trees. The rough grading of the areas requiring gravel may be done using the same methods. The objective of the rough grading is to provide sufficient backfill material to each property prior to final grading the property. Final grading is done before the sod application or the compaction of the gravel areas.

Backfill operations will be performed in a manner to minimize tree root exposure. The Contractor will make reasonable efforts to backfill clean soil around trees on the same day the contaminated soil is removed from around the trees. The clean backfill will be placed to the original ground surface level around the trees. After the soil is placed, the tree roots will be immediately watered. Watering will be scheduled to not interfere with or impair grading activities in preparation for sod.

Intermediate grading will be performed with hand rakes. Large clumps of soil will be removed or broken. High and low spots will be identified and removed. Contours will be smooth, with gradual changes blended to the natural slope of the property.

Gravel and rock will be placed as specified on the construction plot plan. At the discretion of IDEQ and in consultation with the property owner(s), Portland cement concrete or asphalt pavement may be installed on residential or commercial property or rights-of-way. Design requirements will take into account soil conditions, groundwater and surface water conditions. The application of Portland cement concrete or asphalt pavement will be conducted in accordance with local government requirements. The Contractor will propose a job-mix formula for asphalt pavement in accordance with local government specifications or as requested by IDEQ. Before placing base coarse and hard surface, the Contractor will ensure the underlying material is stable, clean of foreign substances, and meets compaction requirements. Ruts or soft, yielding surfaces will be corrected. Hard surfaces will have no deviations greater than 3/8 inches within a 10-foot section.

Rock, as rip rap, used to control erosion in ditches and channels will consist of durable, angular material. The size and thickness of the barrier will be based on flow velocities and determined on a case-by-case basis. A geotextile fabric to exclude the intrusion of surrounding contaminated soil may be necessary prior to rock placement.

Compaction is discussed in Section 5.5.2. Final grading and compaction procedures for soil fill are discussed in Section 5.7.

### 5.5.2 Compaction

Preliminary compaction of the soil backfill for the rough grading procedures on residential property, commercial property and rights-of-way will be accomplished using the buckets of the backfill equipment to back blade the material to the required thickness. General compaction will be from 80% to 90% proctor or as required to provide the necessary firmness for the installed barrier to avoid future settlement. Final compaction will be conducted as identified in Section 5.7.1. or 5.7.2. Uniform compaction over the property is the goal to minimize differential settling. Over-compaction of soil interferes with plant growth, damages structures, and creates future maintenance problems. Compaction of soil will not be performed when wet conditions exist.

Soil will become compacted as equipment travels over it. The number of vehicle and equipment passes across soil will be minimized. Reduced or low ground-pressure equipment will be used. Access and haul roads of will need to be loosened by ripping and tilling, as necessary, during initial grading. Haul routes and equipment operation over garden areas will not be allowed. Final grading and compaction procedures for soil fill are discussed in Section 5.7. Hand compaction by mechanical or other means to 80% to 90% proctor adjacent to structures is required to avoid settlement.

Gravel areas will be compacted, as appropriate, using suitable equipment. This creates a firm, unyielding surface to avoid future settlement and drainage problems. Compaction will be tested in accordance with ASTM D6938 or appropriate evidence correlating the number of passes of specific equipment over similar material and depths to attain the desired compaction. Compaction of gravel fill to 95% proctor will be required, unless local government specifications dictate otherwise for

driveways, parking areas, road surfaces, road base, road sub-base, rights of way, and walkways. The Contractor will place Type I and II gravel, or other gravel as specified, in areas where walkways, roads, driveways and egress/ingress will occur. Other gravel areas (e.g. inside structures) will be compacted to 90% proctor, minimum, unless local government specifications dictate otherwise. Rock will be placed and tamped in-place with the bucket of the backfill equipment.

## 5.6 BARRIER THICKNESS VERIFICATION

Contractor will provide barrier thickness verification:

- Every 200 square feet in areas receiving a 12-inch barrier
- Every 200 square feet in the garden areas
- Every 200 square feet in the gravel road and parking areas
- Every 500 square feet in areas receiving a 6-inch barrier.

The number of barrier thickness verification holes/cones to be placed is based on the square footage as indicated. The Contractor will round up for any fraction in determining the number (e.g., calculate 7.4 holes/cones, place 8 holes/cones). Depth measurement holes will be placed by the Contractor in the backfill as soon as backfill activities for the property are completed. At the discretion of IDEQ, an alternate method of depth verification, such as placement of grade stakes, may be conducted.

The IDEQ or their designated representative will verify barrier thickness, after the Contractor completes all final backfill activities and prior to sod installation or seed application. The IDEQ or their designated representative will document depth verification activities on the construction plot plan.

In general, barrier thickness verification will not be conducted for property barrier enhancement (greening) activities. If partial removals are dictated by IDEQ for barrier enhancement, thickness

verifications may be conducted for up to 3-inches in yard/gravel areas and up to 5-inches in flower beds.

## 5.7 VEGETATION PLACEMENT

The Contractor will submit certificates of inspection of sod and seed by state or federal authorities to the IDEQ. The Contractor will submit copies of delivery invoices or other proof of type and quantities of wood fiber and fertilizer to IDEQ. All plant materials delivered onsite will be properly identified and will be in healthy condition at the time of installation.

The Contractor will notify the IDEQ a minimum of 24 hours prior to installation of sod/planting of grass/hydroseeding. Product certificates will be supplied on demand.

Fertilizer will be commercial grade, with a uniform composition, and be biodegradable, non-polluting, non-volatile, non-toxic, sterilized, and weed free. Commercial, lawn starter fertilizer, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose will be used. Manufacturer's application directions will be followed. At least 50 percent of nitrogen (N) will be present in a slow-release formulation. Fertilizer will be applied at a rate of 1 pound actual (i.e., available) nitrogen per 1000 square feet, or as specified by the manufacturer. Weed and feed fertilizer will not be applied during initial sod application or grass seeding activity. Sod is not to be placed after October 15, unless otherwise authorized by the IDEQ.

Commercial Properties

Commercial areas designated to be vegetated will be prepared to receive sod (Type I commercial property) or a grass seed mixture (Type II commercial property).

ROWs

ROW areas designated for vegetation will be prepared to receive sod or a grass seed mixture. Sod will be placed in areas where sod previously existed, in residential areas, and where immediate vegetation is required to protect the barrier. Seeding will be conducted in other ROW areas. Seeding of clean soil barriers is predominantly expected. Direct seeding of the existing surface may occur in Type III ROW areas (i.e., areas not readily accessible to the public).

The grass seed mixture for ROW placement will be as specified by IDEQ. The mixture is to be applied at a minimum rate of 40 pounds of pure live seed per acre. Fertilizer and mulch will be applied, when necessary, at a rate of 200 pounds per acre and 2000 pounds per acre, respectively. Seed and fertilizer rates will be at a rate necessary to promote long term sustainable growth. Seed mixtures must be certified to ensure weed problems do not occur, especially in residential areas. Actual application rates may vary based on site specific conditions.

### 5.7.1 Sod

Sod application includes the final grading of the topsoil and the necessary handwork using any one or more of the following items: harley rakes, roto tilling devices, hand and haul roller compactors, and tamping tools prior to installation of the sod. To prepare the soil for vegetation placement, the top 2 to 4 inches will be power-tilled and raked smooth to a final grade. A 100-pound, 3-foot wide roller compactor, half-full of water, will be used to provide final compaction. A smooth, firm, uniform surface will result from compaction suitable for sod application. Compaction of soil will not be performed when wet conditions exist. The Contractor will rake the top inch to provide the final sod-bed. The final soil grade will be 1 inch below sidewalks and driveways. The slope of the property will be considered in the final grading to ensure proper drainage away from the buildings or other structures on the property. The Contractor will apply root fertilizer (lawn starter fertilizer). A "whirlybird" or equivalent applicator spreader will be utilized to distribute fertilizer evenly over the

property. The fertilizer will be raked into the soil. Care will be taken to not create uneven or low areas. The soil bed will be lightly watered prior to laying sod to provide a moist base for the turf. During hot weather, application of fertilizer will be conducted after sod installation.

The sod will consist of dense, well-rooted growth of permanent and desirable grasses. The grasses will be indigenous to the general area where the sod is transplanted. Sod will consist of perennial rye grass, and blue grass or as approved by the IDEQ. The sod will also be practically free of thatch, weeds, undesirable grasses, nematodes, insects, diseases, undesirable plants, stones larger than 1 inch, woody plant roots, and other material detrimental to growth. The sod will be delivered in uniform strips (generally 24 inches by 60 inches) with uniform thickness (machine cut to ½ to ¾ inch excluding growth) to permit rolling and lifting without breaking. Sod is to be placed within 36 hours of harvesting at the nursery. The sod will not be dry, slimy, decomposed, moldy, yellow, irregularly shaped, torn, uneven, or contain holes. Sod will be installed immediately upon delivery. In hot weather, the unlaid sod will be protected by placing the stacks of sod in shade and covering with moist burlap sacks.

Begin laying sod along the longest straight line. The sod will be placed in parallel strips in a staggered pattern (brick-like fashion). Sod is to be placed with tight seams and joints (no spaces) between adjacent pieces and at boundaries with structures. Sod will not be stretched. Full width pieces of sod will be placed adjacent to structures. Avoid placing small strips at outer edges of the property. On slopes, begin by placing sod across the bottom, perpendicular to the slope. Then place the remaining sod across the face of the slope. Avoid causing indentations or air pockets under the sod by repeatedly walking or kneeling on the turf while installing or shortly afterward. If necessary, use wooden planks or plywood to minimize the creation of indentations during installation. To prevent wilting, water lightly after every 30 minutes or after every 200 square feet of installation. Sod will receive 1 inch of water within 30 minutes of complete installation. Watering should saturate the sod and underlying soil to a depth of 4 inches. Additional watering may be required

during hot weather. After the sod and topsoil has dried sufficiently to prevent damage, the Contractor will roll the sod in 2 perpendicular directions with a 100-pound roller, half-full of water. Heavy rolling to correct irregularities will not be allowed. If there are areas where a roller cannot be used, due to space restrictions or for other reasons, the sod will be tamped to ensure a good bond with the soil.

Lawn maintenance activities and responsibilities, including watering, are identified in Section 10.3.

### 5.7.2 Grass Seed

The application of grass seed includes the final grading of the topsoil and the necessary handwork using any one or more of the following items, roller compactors, tamping compactors and hand tools. To prepare the soil for vegetation placement, the top 2 to 4 inches will be power-tilled, and raked smooth to a final grade. A 100-pound, 3-foot wide roller compactor, half-full of water, will be used to provide final compaction. A smooth, firm, uniform surface will result from compaction suitable for grass seed application. Compaction of soil will not be performed when wet conditions exist. The Contractor will rake the top inch to provide the final soil-bed for seed application. The final soil grade will be just below sidewalks and driveways. The slope of the property will be considered in the final grading to ensure proper drainage away from the buildings or other structures on the property. Dust generation will be avoided when loosening soil. A lawn starter fertilizer containing nitrogen, phosphate and potassium will be applied as specified in Section 5.7 and 5.7.1.

The grass seed will be pure live seed, clean, and received in unopened packages bearing the analysis of the contents. Copies of the seed product information should be submitted to IDEQ by the Contractor with the property invoice. The seed will be of a northern variety of upland seed mixtures, of a locally adapted ecotype. Seed will comply with AMS-01 (August 1995), Federal Seed Act Regulations, part 201, as updated. The seed will also be practically free of weeds, undesirable

grasses, insects, diseases, undesirable plants, and other material detrimental to growth. Grass seed must be approved by IDEQ prior to application.

The grass seed mixture (perennial rye grass, blue grass and fescue) will be applied at the rate specified by the manufacturer or supplier or as described herein as approved by IDEQ. Alternative species meeting the objectives may be substituted with the approval of the IDEQ. Substitution specifications must be submitted to IDEQ at least 10 days prior to anticipated use to allow review. A spreader will be utilized to distribute grass seed evenly over the property. The Contractor may utilize a manual or mechanical spreader. The use of a mechanical spreader (hydro-seeder) will be utilized only after IDEQ approval and consultation with the property owner. Seed will be placed in one direction and then in a perpendicular direction. The soil will be lightly watered after placing seed. There will not be any free surface water, but the ground surface will be moist to prevent drift and displacement. Seed application will not be conducted during windy conditions or when the ground is frozen, excessively wet, or otherwise unsatisfactory. Proceed with seeding operation on moist soil, but only after free surface water has drained away.

Apply wood cellulose fiber mulch over seeded areas by mechanical means. Methods to apply wood cellulose fiber mulch will require approval by IDEQ, or their representative. Areas not accessible by mulching equipment will be mulched by approved hand methods. Mulch will be loose enough to permit penetration of sunlight and air circulation, but dense enough to shade ground, reduce evapotranspiration, and prevent or materially reduce erosion of the underlying soil. Wood cellulose fiber mulch will be applied at the rates recommended by the seed supplier or as provided herein as approved by IDEQ. Material to be Enviroblend, Hydrostraw, or approved alternate. Paper mulch, may be used in well irrigated applications upon approval from IDEQ. Paper mulch, which when applied in areas that do not receive adequate irrigation can create an impermeable barrier, will not be used.

The wood cellulose fiber mulch to be used will contain less than 250 mg/kg boron, and will be otherwise nontoxic to plant or animal life. The organic matter content will be at least 93 percent on an oven-dry basis as determined by ASTM D586. The moisture content will be no more than 15 percent as determined by oven-dried weight.

Lawn maintenance activities and responsibilities, including watering, are identified in Section 10.3.

Mechanical Seeding

The Contractor will notify IDEQ and will not begin seeding until the soil prepared or designated for seeding has been approved.

Seed will be sown by using an approved hydroseeder that uses water as the carrying agent and maintains continuous agitation through paddle blades. It will have an operating capacity sufficient to agitate, suspend, and mix into homogeneous slurry the specified amount of seed and water or other material. Distribution and discharge lines will be large enough to prevent blockage and will be equipped with a set of hydraulic discharge spray nozzles that will provide a uniform distribution of the slurry. Apply seed at rate recommended by manufacturer or supplier, or higher rate as directed by IDEQ.

A “two shot” method shall be used where seed and fertilizer are applied with a trace of mulch followed by a mulch only application. This will allow more seed to be in contact with the soil and less tied up in the mulch. Seed and fertilizer may be applied in one application, providing the material is placed in the hydroseeder no more than 30 minutes prior to application and is applied according to manufacturer’s recommendations.

Hydroseed Mix and Application

Mix shall provide a slurry for an even application over the entire area to be hydroseeded. Hydroseed mix guidelines are provided in Table 3A. Apply water to support growth of hydroseed mix per Section 10.3 of this report.

Table 3A. Hydroseed Guidelines Per Tank Load

| **Hydroseed Mix** | **Quantity[1]** |
|---|---|
| Primary Grass Seed – Premium, duraturf, ecoturf, or specialty (i.e. clover mix) | 80 lbs |
| Annual Ryegrass | 15 lbs |
| Mulch – Enviroblend[2], 70 wood:30 paper 3 bags (150 lbs), Hydrostraw, 80% straw 3 bags (150 lbs). | 300 lbs |
| Fertilizer NPK 10-20-20+6 MgO | 80 lbs |
| Tackifier | 60 oz |
| Water | 800 gal |

1 Quantities are based on 2000 lbs much, 400 lbs fertilizer, and 345 lbs seed per acre.

2 Enviroblend may be reduced if thinner material is required.

Hydroseed Loading Procedure

To ensure proper placement and growth of seed, the following procedure should be used in association with mixing and loading recommendations for hydroseed. After starting and warming machine engine, fill tank with water. Purge spray tower, hoses, and recirculation lines should be flushed with clean water at start of initial work period. Once material residuals have been removed, load seed, mulch, fertilizer, and tackifier into the slurry tank per mixing specifications presented above to produce a homogeneous slurry. Engage agitator to full forward position to achieve sufficient mixing of slurry.

### 5.7.3 Plants

The Contractor will generally work to protect all existing plants from damage during construction, except those designated for removal. Damaged or injured plants will be replaced with similar nursery stock, (or as agreed upon with the homeowner) by the Contractor. Proper care in planting will be practiced. Plants will be in a healthy condition and will be warrantied by the Contractor for one year.

Damaged or injured trees will be cared for or replaced by the Contractor with healthy nursery stock. Efforts to protect and sustain good tree health will be practiced by the Contractor. If the tree is damaged beyond repair the contractor will replace the tree with another as approved by DEQ and the homeowner. The Contractor shall plant the tree using current tree planting techniques based on industry standards.

## 5.8 FREE RESIDENTIAL SOIL

For residences requiring no remediation (i.e., the lead content is less than 700 mg/kg and the arsenic content is less than 100 mg/kg), a maximum of 11 cubic yards of clean soil for residential use may be delivered, upon written request by the resident. The soil will be made available in areas where remediation work is occurring. A property owner form to request this soil is included in Appendix J.

# 6.0 SITE CONTROL

The Contractor will develop a Site Control Plan (SCP) for the construction season. The SCP will be submitted to the IDEQ for review and comment. The SCP must be approved by the IDEQ prior to the initiation of on-site activities (i.e., before starting work). The SCP will contain descriptions of 1) dust control, 2) erosion and sediment control, 3) health and safety, and 4) clean property access aspects of the work, including the measures the Contractor will employ during the work. The SCP will identify a site manager or other responsible person for administration and implementation of the Plan. The Contractor will avoid any activity that causes or may result in cross-contamination.

## 6.1 DUST CONTROL

Dust control will be achieved primarily through construction and engineering practices. In particular, visible emissions will be minimized to ensure that fugitive dust does not become a problem. Air monitoring in accordance with Occupational Safety and Health Administration (OSHA) requirements may be required during remediation activities if fugitive dust emissions become a problem.

The Contractor will provide the equipment and labor necessary to apply water to the property during remediation activities. Water application may be required during evenings, weekends or holidays to prevent airborne dust emissions. Dust control measures will be periodically inspected and corrective action taken, when necessary. Water applications will be provided by the Contractor throughout the project on an as-needed basis as follows.

- Prior to excavation activities
- During soil removal operations
- At work intervals where wind and/or dry weather create airborne emissions

- Stockpiling or loading of soils in staging areas before off-site transportation
- Washing off sidewalks, alleys, or streets impacted by soil handling and transportation activities (these areas may be swept if it can be accomplished without dust)
- Washing down paved areas at the entrances of soil repositories
- On contaminated soil or gravel prior to transportation off-site in covered dump trucks
- On excavation sites prior to backfill placement
- Prior to leaving the premises at the end of each workday.

Water used by the Contractor will be free of hazardous or toxic contaminants. Water applications will be limited to short-term applications. Saturated soil conditions will be avoided to prevent pooling and generating muddy conditions. To provide adequate water coverage, the Contractor will use a misting application with a fogging type nozzle, when necessary. After washing down sidewalks, streets, alleys and other paved areas, accumulated contaminated and clean soil will be picked up and properly disposed of (Section 7.0). Under no circumstances will contaminated or clean soils be washed into storm drains or onto adjacent property or right-of-ways. Sample information for water used by the Contractor shall be provided to IDEQ upon request.

In addition, contaminated soil storage piles will be removed at the earliest opportunity to minimize the time these piles are left on-site. The Contractor is required to clean up spilled and tracked material on a daily basis. If contaminated soil piles cannot be removed from the site by the end of day, the Contractor will cover the pile with tarpaulins. The tarpaulins will be secured such that wind will not uncover the pile. Contaminated soil piles will not be left on sidewalks, alleys, streets, or roads at any time.

## 6.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment control is required and will be employed at all times to achieve best management practices (BMP's) for storm water management and sediment control, including material tracking. Contractor will comply with the Catalog of Storm Water Best Management Practices for Idaho Cities and Counties (IDEQ 2006), and any local requirements. Erosion and sediment control will be achieved primarily through construction and engineering practices. In particular, temporary measures to control run-off and run-on will be installed. The Contractor will provide the equipment and labor necessary to install silt fences, straw bales, berms, and dikes, as necessary to achieve erosion and sediment control. Materials specifications for all BMPs shall be as indicated in the Catalog of Storm Water Best Management Practices for Idaho Cities and Counties (IDEQ 2006).

The Contractor will inspect, maintain and repair temporary erosion control measures at least once per week. Erosion control measures will be inspected and repaired, as necessary, after each storm event resulting in a total rainfall of ¼ of one inch or greater within a 24-hour period, as measured by the National Weather Service Station for Kellogg, Idaho.

The Contractor will remove temporary erosion control measures at the completion of site activities.

## 6.3 HEALTH AND SAFETY

Contractors are required to submit a health and safety plan and IDEQ must approve this plan prior to beginning remediation work. Contractors will comply with OSHA General Industry and Construction Industry Safety and Health Standards and other applicable laws and regulations, including 29 CFR 1910.120. Health and safety measures are required to protect Contractor work crews (including truck drivers) and the public during property remediation. The Contractor will

describe aspects of the work requiring health and safety measures and identify what measures the Contractor will implement during remediation. The Contractor will also describe site access control measures to restrict entry by unauthorized personnel to the project area. Health and safety control measures include, but are not necessarily limited to sanitary, drinking water, and washing accommodations, noise control, housekeeping, personnel and equipment decontamination, and traffic control.

Traffic control, including resident and employee parking, is a required component for the health and safety section. The Contractor's work will cause no unnecessary inconvenience to the public. Rights-of-way, except when being remediated, will be maintained at all times, unless interruption is authorized by the proper local authority. During any equipment or material loading or unloading that may interfere with traffic, acceptable detours will be provided for the duration of the activity. The Contractor will comply with requirements of all applicable local governments for closure of any street, road or highway. The Contractor will provide all required barriers, guards, lights, signs, and flaggers. All signs, barricades, use of flaggers and other traffic control will conform to the requirements in the Manual of Uniform Traffic Control Devices, the Standard Highway Signs and Standard Alphabets for Highway Signs, and OSHA construction industry standards. The Contractor will inform the public of any detours or construction hazards, as necessary. The Contractor will promptly remove all signs and warning devices upon completion of the work impacting local traffic.

Equipment and contaminated materials will not be placed in areas that have received prior remediation. The Contractor will avoid any activity that causes cross-contamination. The Contractor will be responsible for the decontamination of vehicles and equipment leaving the project area. Vehicles and equipment will be considered contaminated once they enter the project site. Decontamination requirements will be coordinated with the IDEQ. The Contractor will provide any facility requirements (water and manpower) for vehicle and equipment decontamination. Decontamination is required for activities conducted during property remediation that involve

contact with contaminated soils. The Contractor's SCP will include a description of decontamination procedures. In general, after completion of site activities, equipment and tools used for excavation of contaminated materials will be decontaminated on-site. Decontamination will first involve a brush down of remediation equipment within the site. The contractor will dry brush machine tires and equipment (e.g., rakes and shovels). Use of water will be limited or avoided whenever possible. The use of water will be required to adequately decontaminate equipment, if:

- Visible contamination is evident
- Prior to leaving the site for any reason.

In these cases, the equipment will be washed off while on the premises to minimize the migration of contaminated mud and water onto the streets and rights-of-way.

Workers will be required to decontaminate daily or whenever leaving the project site. The Contractor will provide a decontamination protocol in the health and safety section of the SCP. Streets, rights-of-way and access routes will be kept clean of noticeable accumulations of soil, dust, or debris that are attributable to yard enhancement activities at all times.

## 6.4 CLEAN ACCESS

During on-site activities, the Contractor will provide and maintain safe, clean access to the property owner at all times. Clean access means the resident or owner will not be forced to walk through work areas when entering or leaving their buildings (e.g., residence, office, etc.). Streets and sidewalks will be thoroughly brushed and washed off with water at the conclusion of each workday, and as necessary during the workday, to provide clean entry to the property. If no sidewalk is present on the property, a clean pathway will be provided by laying down plywood, pallets, plastic, or using some other means to prevent exposure and tracking of contaminated soils into the residence. The temporary pathway must also provide a non-slip, stable surface to minimize the potential for injury

to persons entering or leaving the property. Access to the property may need to include handicapped access, if necessary.

# 7.0 DISPOSAL

Removal of contaminated soil requiring disposal is expected to occur for residential property remediation, commercial property remediation and rights-of-way remediation work. For property barrier enhancement activity, soil excavation is not anticipated; therefore soil disposal is not required. The IDEQ will designate repositories for Contractor's use during work.

Soil exceeding the action levels (1000 mg/kg Pb and 100 mg/kg As) and debris excavated from the property will be transported to IDEQ and EPA approved locations. At the discretion of IDEQ and EPA, repository locations may change during the course of completing the work. Waste generated during property remediation activities may require segregation. Waste may be separated into:

- Soil and gravel
- Gravel and clean wood debris (e.g., tree and shrub material not in direct contact with the ground)
- Dirty wood debris (e.g., tree and shrub material in direct contact with the ground)
- Grass (including sod)
- General construction debris (e.g., concrete and piping) waste streams.

The waste streams may have different destinations for disposal at the discretion of IDEQ.

## 7.1 WASTE TRANSPORT

Contaminated material and debris removed from the property will be transported to approved locations in street-legal dump trucks in accordance with applicable state and local regulations. Access to the repositories will involve transport across public roads within the Basin. This operation will be limited to daylight hours and will be done in a safe and controlled manner. Loads will be kept below the upper edges of the truck bed and will be covered during transport to eliminate the dispersal of lead-bearing material through airborne emission or spillage. Truck liners will be used if free water

is present in the excavated material or if soils are flowable. Spillage that occurs on streets and roads will be cleaned up immediately.

The Contractor will document waste transport and include this information in their daily activity reports on a truck-load-basis per property remediated.

## 7.2 REPOSITORY OPERATION

The following subsections describe basic requirements for the operation of repositories used in completion of remedial activities. More specific details may apply for individual repositories and Contractors.

### 7.2.1 Dumping Procedures

Dump trucks will be used to transport the excavated materials from each property being remediated to the designated repository. Once at the repository and just prior to dumping, the cover will be removed from the truck. After dumping, decontamination procedures outlined in the applicable repository operations plan will be followed.

### 7.2.2 Grading Procedures

A tracked-dozer will be used at the repository to grade and compact the material in successive lifts to an even thickness as directed by the IDEQ. This tracked-dozer will be decontaminated before leaving the repository.

### 7.2.3 Dust Control

Dust generation at the repository site will be minimized by using water trucks to spray haul routes and the material lay down area to prevent airborne emissions. This will be done on an as-needed basis.

### 7.2.4 Decontamination

All trucks and heavy equipment will be decontaminated before leaving the repository. If operational circumstances at the repository require dumping without decontamination, truck traffic shall be restricted to designated clean haul routes and dump areas to prevent tracking of contaminated sediment off site.

### 7.2.5 Access Control

Unless otherwise approved by IDEQ, the repository will be secured behind a locked gate. Signs will be provided stating this is private property and to KEEP OUT. The gate to the repositories will be opened at the beginning of each day of activity and will remain open until close of repository operations for the day. The IDEQ or its designee will be responsible for ensuring that the repository is locked at the end of each day for the duration of Basin property remediation. Weekend access, if necessary, will be provided through coordination with the IDEQ.

## 7.3 SEASONAL CLOSURE

Seasonal closure of the repositories will occur at the completion of the construction season. Once all of the excavated material has been transported to the repository and no further excavation activities are to be conducted that construction season, the Technical and Remedial Services Contractor will

perform temporary grading of the material placed in the repository. Grading procedures will be followed as per the agreed upon repository operations plan to create a uniform stockpile of material. After the grading is completed, those portions of the repository that have reached final closure elevation, as determined by the IDEQ, will be re-vegetated, capped with gravel, or other means applied to control surface water and dust. As required by the IDEQ, an ICP repository area will be set aside to accept materials year round.

## 7.4 DOCUMENTATION

The Technical and Remedial Services Contractor will provide waste disposal information to the IDEQ in the daily reports. The Contractor will summarize disposal activities at the conclusion of each construction season or when they have completed their remedial work for the year. The IDEQ, or their designee, will describe waste disposal activities in an *Annual Construction Completion Report* (See Section 12.3).

# 8.0 PROPERTY BARRIER ENHANCEMENT

For residential properties that have a lead content of ≥700 mg/kg, but less than 1000 mg/kg, barrier enhancement will be conducted. Property barrier enhancement (also known as **greening**) includes the installation of various uniform prescriptions on a one time basis that will result in risk reduction by providing a continuous, sustainable barrier to underlying contaminants. The area requiring barrier enhancement will be identified on the construction plot plan. The remedy implemented will be determined by the IDEQ representative in the field. Appendix B includes a summary of property barrier enhancement options.

The following sections provide a detailed description of enhancement options. In certain situations, although an enhancement remedy may be specified due to the sample results, there are no enhancement actions that would improve upon the current condition of the area. For these specific scenarios, the IDEQ Project Coordinator will visit each property, confirm the walkthrough personnel recommendation that no enhancement action would improve the existing condition(s) of the area(s) in question, photograph the area(s) in question, and complete a Barrier Enhancement – No Action Form (see Appendix I). The completed form and photographs will become part of the property record. In these situations, no action is taken and this is identified on the corresponding property record drawing plot plan.

As described in Section 1.2.2.1, barriers must prevent direct exposure to contaminated soil and migration of contaminated soil and dust into homes. In particular, vegetative barriers must be continuous and sustainable, with no bare soil exposed.

For each property requiring barrier enhancement, enhancements will focus on the following areas:

- building drip zones

- grassed areas
- parking areas
- play areas
- recreation areas
- walkways
- pet areas
- porches
- flower gardens/ rock gardens

In some instances, the barrier enhancement remedy will require the Contractor to scrape and grade (and possibly remove 2-3 inches) in a designated area. The addition of clean material in these areas may be necessary. These remedies will be on a case-by-case basis and identified during the pre-configuration walkthrough with the IDEQ.

## 8.1 BUILDING DRIP ZONE ENHANCEMENT

Drip zone enhancement will include the placement of raised perimeter boxes within the drip zone of buildings located on the property. The contractor will place raised boxes within the building drip zone in a manner that will not interfere with drainage away from the foundation. Enhancement activities around ground-level windows or window wells will be identified during the pre-remediation walkthrough. These activities will be determined on a case-by-case basis.

Raised bed boxes may be installed as a greening. Option 1 includes a box filled with gravel without plants. Option 2 is a box filled with soil and mulch without plants. Option 3 is a box filled with soil and mulch with plants.

### 8.1.1 Raised Bed

The raised perimeter beds will be placed within the drip zone of the building roof on the property. The actual location will be determined on a case-by-case basis. The perimeter bed is to be constructed from 2" x 6" Alkaline Copper Quaternary (ACQ) or similar pressure treated lumber for outdoor use. The contractor will not use landscaping materials containing chromate copper arsenate, ammonia cal copper arsenate, or creosote.

A visual marker will be placed under all raised bed installations under the property barrier enhancement activities. If one type of fill is placed in the raised bed box, the visual marker will be placed prior to fill placement (i.e., in the bottom of the box). If multiple fills are placed, a weed barrier may also be placed at the interface between the two kinds of fill (e.g., over the topsoil but under the landscape rock, mulch or wood chips).

Weed barrier fabric will be durable, woven, UV resistant polyethylene or polypropylene for the standard use of controlling or suppressing seed growth in landscaping applications, but allowing water, air, and nutrients to permeate through.

### 8.1.2 Fill

A filter fabric weed barrier will be placed in the bottom of each box before fill is placed, except in instances where plants will be placed in the raised box. Backfill will be placed on the filter fabric in such a manner as to not tear or puncture the material.

The Contractor will use an approved method of ways and means to fill raised bed boxes on the property.

Grading activities will be conducted with hand rakes. Large clumps of soil will be removed. High and low spots will be raked level or with a slight grade away from the foundation and removed.

Fill material (i.e., soil or gravel) will be compacted from 80% to 90% proctor. A smooth, firm, uniform surface will result from compaction. When multiple types of fill are placed, each type of fill will be compacted separately. Lower fill will be compacted prior to placement of upper fill.

Option 1. Place 5½ inches of gravel or soil over filter fabric.

Option 2. Place 4 inches of topsoil, compact, place filter fabric and then place 1½" of bark mulch or landscaping rock.

Option 3. See 8.5

## 8.2 YARD AREA ENHANCEMENT

For residential property having scattered bare spots in the yard, the Contractor will apply grass seed as specified in Section 5.7.2. Sod may be placed at the discretion of IDEQ. Sod placement will be conducted as specified in Section 5.7.1.

## 8.3 PARKING AREA ENHANCEMENT

Barrier enhancement of designated parking and driveway areas will be conducted on a case-by-case basis, as determined by IDEQ.

If no gravel parking area exists, gravel may be placed. Gravel areas will be leveled and compacted to 95% proctor. Compaction will be accomplished using suitable equipment to avoid future settlement

and drainage problems. A smooth, uniform surface will result. The gravel will be graded to drain rainwater from the surface.

## 8.4 WALKWAY ENHANCEMENT

High foot-traffic areas can create bare spots in soil, generating mud and dust. A more durable walkway or path may be installed as a barrier enhancement. The walkway options include placing a raised gravel path, or various kinds of stones to create a walkway. When stepping stones are used, grass seed may be applied between the stones to ensure bare soil is vegetated.

### 8.4.1 Gravel Walkway

A raised bed will be placed on-site over designated walkways to receive enhancement. The actual location and dimensions will be determined on a case-by-case basis. The raised bed box is to be constructed as described in Section 8.1.1. The walkway can be up to 3 feet wide. Fill is to be placed as described in Section 8.1.2. Gravel will be placed in the box to a depth of 5½ inches.

### 8.4.2 Stepping Stones

The stepping stones will be square or circular shaped stones and made of cement or natural rock. Stepping stones will be placed in designated areas, along a walkway, no more than 8 inches apart. Optimal spacing is 4 inches. The Contractor will conduct leveling or other activities necessary to place stepping stones as necessary.

## 8.5 PLAY AREA AND RECREATION AREA ENHANCEMENT

Designated play areas may have a raised bed installed. The raised bed will be constructed on-site. The actual location will be determined on a case-by-case basis. The raised bed box is to be 8 feet by

10 feet and constructed as described in Section 8.1.1. Fill is to be placed as described in Section 8.1.2.

Option 1. Place 6" of gravel or soil over filter fabric and compact.

Option 2. Place 6" of bark mulch or wood chips over filter fabric.

## 8.6 PET AREA ENHANCEMENT

A designated pet area may have a raised bed installed. The raised bed will be constructed on-site. The actual location will be determined on a case-by-case basis. The raised bed box is to be constructed as described in Section 8.1.1. Fill is to be placed as described in Section 8.1.2.

## 8.7 PORCH ENHANCEMENT

The area underneath porches or decks may have a protective barrier installed. Either a gravel barrier (Option 1) or a lattice and trim barricade (Option 2) will be installed.

For Option 1, gravel will be placed directly over the existing ground or a raised bed will be constructed as described in Section 8.1.1, except 2" x 4" treated lumber is to be used. The actual location will be determined on a case-by-case basis. Fill will be placed as described in Section 8.1.2. The Contractor will place 3 inches of Type I gravel over the visual marker in the raised bed.

For Option 2, exposed soil under porches will be barricaded by ACQ wood framing, lattice and pine trim. The Frame will extend along all edges of the lattice, including the bottom. The wood will be further treated with a water sealant, per the manufacturer's instructions. If the soil is likely to be wind blown from underneath porches or decks, 2 inches of Type I gravel will be placed over the soil

before installation of the lattice barricade. Plastic lattice may be substituted for wood lattice upon approval by IDEQ or their representative.

## 8.8 FLOWER GARDEN ENHANCEMENT

The barrier enhancement for flower garden areas depends on the activity occurring in the flower garden. For situations where the flower garden are actively worked and it is not a rock or bark garden only, the enhancement will include a 5 inch removal and replacement. Bulbs and/or flowers may be removed prior to remediating, or if the owners are unable to remove the flowers, the Contractor will do so under the owner's guidance. The Contractor will replant the flowers following remediation. The Contractor will dig around larger plants (e.g., bushes). For situations where the owner/renter is not actively working the flower garden (i.e., the area is a rock garden or bark garden), the enhancement remedy will be to add soil, or cover material (landscape rock, gravel, or bark).

# 9.0 PRIVATE DOMESTIC WATER SUPPLY

Domestic wells pose a potential human health hazard where metal concentrations are above prescribed limits. Proper closure of such wells will provide protection of human health by eliminating the contact and ingestion of contaminated water. Closure of wells will also reduce groundwater and surface water interaction and potential migration of contaminants. Well closure activities and establishment of an alternative water supply will be coordinated with other site remediation activities, such as soil remediation. This will promote efficient use of equipment, personnel and materials, and minimize potential impacts on property owners and installed barriers. At the direction of IDEQ or their designated representative, the IDWR will be notified by the Contractor of well closure activities through completion and submission of the Application for Abandonment of a Well Form (Form 238(4)-2) and will be invited to provide oversight as they determine necessary. The Contractor will be responsible for completion of required forms and submission to IDWR. All correspondence will be duplicated for IDEQ's file on the property. The Contractor will be licensed through the State of Idaho to conduct well closure, and if applicable, new well installation activities.

## 9.1 WELL CLOSURE ACTIVITIES

### 9.1.1 Well Closure Methods

Wells closed under this RDR are assumed to be less than 5 feet in diameter. Small diameter wells can be effectively closed following the methods identified in IDWR rules and regulations and the Well Abandonment publication of the IDWR (IDWR 1991). The procedures to close or otherwise abandon a well are as follows:

- Contractor will arrange a mutually acceptable date and time with the property owner and IDEQ for performing closure activities.

- Well surface casing and the surrounding area will be visually inspected to ensure the appropriate well is being closed. Location will be documented after careful identification.

- Electrical lines to well pumps will be disconnected and the wiring will be removed prior to closure, if present.

- Pumps, pipes and wiring will be pulled from the well prior to closure.

- The total depth of the well and depth to groundwater will be measured. This information will be recorded by the Contractor.

- The annular space between the well casing and borehole must be sealed to prevent surface seepage along the outside of the well casing. The casing should be removed or perforated prior to placement of sealing material. Perforations will be made using common methods (e.g., Mill's knife, Hawk downhole perforator, cavity shot).

- The slurried sealing material will be placed in one continuous operation from the bottom of the well to the top. This will reduce segregation or dilution of material when placement occurs. The sealing material will be either from a ready-mix concrete plant or portable grout plant. Lumps will be removed from the sealing material by using a protective strainer on the tank from which the material is pumped. This will avoid plugging the casing.

- Well casings will be backfilled to the ground surface.

- The well will be marked with an identification number and the date of closure. If possible, this information will be stamped, painted or otherwise marked on the casing. Painting is the preferred option.

- Closure records containing the following information will be provided by the Contractor:
    1. Quantity and type of sealing material
    2. Method(s) used to place sealing material.
    3. Static water level and total well depth.
    4. Visual observations made during closure.
    5. Site sketch depicting well location.
    6. IDEQ well closure record (Appendix I)

- Work that requires a driller will be performed by a drilling contractor licensed in Idaho.

- IDEQ or their designated representative will oversee all abandonment/closure activities and keep an accurate record of events and materials used for IDEQ's file on the property.

A copy of the IDEQ well closure record abandonment record (see Appendix I) will be submitted to the local office of IDWR.

## 9.2 ALTERNATIVE WATER SUPPLY

For residences having their domestic water well closed due to metal contamination, an alternative water supply will be provided for the residence by IDEQ. The alternative water supply may include:

- Connection to an existing water distribution system
- Installation of a new well in a suitable aquifer
- Point-of-source treatment
- Other alternative.

The alternative water supply will be installed and connected to the residence prior to disconnection and closure of the well. In areas where an existing public water distribution system is readily accessible, this is the preferred alternative. When an existing water distribution system is available, the residences will be connected to this system in accordance with existing practices as utilized by the water distribution system owner (e.g., Central Shoshone County Water District, East Shoshone County Water District, Kingston Water District, Cataldo Water District, and Rose Lake Water Association). If point-of-source treatment is necessary, a Culligan reverse osmosis filtration system, or similar product will be installed on a single drinking water source within the residence.

The Alternative Water Supply Record form (Appendix I) will be completed by IDEQ or their designated representative. New wells will be installed in accordance with IDAPA 37, Title 03, Chapter 09 "Well Construction Standard Rules," Rule 25 "Construction of Cold Water Wells of the State of Idaho as administered by the IDWR.

# 10.0 FOLLOW-UP ACTIVITIES

Follow-up activities will be conducted to ensure that the work performed at each property satisfies the scope of the work. The Contractor will provide lawn care, in terms of extended watering to establish the replaced lawns. Once the lawns are satisfactorily established, lawn care will be the responsibility of the property owner.

## 10.1 REMEDIATION COMPLETION SITE INSPECTION

Within 2 working days of completion of field activities, the Contractor will contact the IDEQ to perform a post-remediation site inspection and verify work completion. The property owner(s), Contractor and IDEQ will assess the property during this inspection. During this inspection, the property owner, Contractor and IDEQ will develop a punch list for activities the Contractor needs to complete. IDEQ will record items on the Punch List Form (Appendix I). The Contractor will complete the punch list within 5 working days of this inspection or as directed by IDEQ. A follow-up inspection will occur to verify the punch list items were completed. The property owner(s) will be asked for their sign-off on the Work Completion Sign-Off section of the Access Agreement. This acknowledgment will define completion of the remedy and initiate the two year warranty period. At this time, the property owner will be given a copy of the Barrier Maintenance Plan, the Remediation Access Agreement containing the warranty and dispute language, and the ICP pamphlet.

Video documentation will be conducted by IDEQ following the property completion and will be added to the project record. Should there be any dispute between the property owner(s) and/or IDEQ or their designated representative, and/or the Contractor, the parties involved will notify the IDEQ Project Manager and every attempt will be made to resolve the dispute informally within the scope of work for that property. If the dispute is between the property owner(s) and the Contractor, IDEQ or their designated representative will make every attempt to assist in settling the matter. If the parties involved in the dispute cannot reach an agreement, the arbitration agreement process will be initiated, as described in Appendix E.

Additional inspections will be required for lawn maintenance activities and grass growth acceptance (See Section 10.3) and warranty purposes (See Section 10.5).

## 10.2 CONSTRUCTION DAMAGE REPAIR WORK

The Contractor will repair any damage that occurs as a result of remediation activities. Damage may occur to structures, vegetation, asphalt pavement, or other features on the property or adjacent properties. Survey monuments that are damaged during construction shall be reestablished in accordance with the Idaho Statute 55-1613. The Contractor will repair damages noted during construction activities, as they become known. Emergency repairs may be necessary. The Contractor will notify IDEQ Project Coordinator or designated representative when damage is revealed. Property damage during remedial activities performed by the Contractor will be the responsibility of the Contractor to compensate, repair, restore, or replace. Repairs will be to pre-existing conditions or better and to the satisfaction of the property owner and/or IDEQ Project Coordinator. The Contractor is responsible for addressing damages to existing structures for 180 calendar days and existing vegetation for one (1) year from the date of completion of property remediation, as well as drainage problems resulting from the remediation work for two (2) years.

Video documentation of the pre-existing and, where applicable, the post-remediation condition of the property will be used to determine if any damage has occurred as a result of remediation. In the event there is a dispute regarding the cause of the damage, a three-member Arbitration Panel will make a final decision concerning the dispute (see Appendix E- Access Agreement).

## 10.3 LAWN MAINTENANCE

The Contractor is required to apply water as appropriate and necessary to the grass (whether seed or sod) for a period of 45 calendar days following completion of seeding or sod installation. This will ensure a good growth has been established prior to inclement weather. The soil will be kept moist until the grass or sod is firmly rooted. Water application can be modified based on weather. Watering less may be required if precipitation occurs during the maintenance period. Watering more may be required if the weather is hot, dry and/or windy. Watering can be conducted from a watering truck or using spigots on the property with property owner consent. Water used by the Contractor for grass will be free of hazardous or toxic contaminants.

The Contractor will inspect the properties that receive sod one week (7 calendar days) after the sod is installed. Noticeable cracks between sections of sod will be filled with clean soil fill, as necessary, to provide a smoother lawn. Areas of settlement in sod areas will be addressed. This can be coordinated with water application activities.

The Contractor and IDEQ will inspect the sod or seeded areas 45 calendar days after installation to determine if the growth is well established. The Contractor will repair, replace, reseed, or take other appropriate action if growth is not well established (see Warranty in Section 10.5 and Appendix E). If the sod and seed application is accepted after 45 calendar days, the Contractor will have no additional responsibility for the sod and seed. In cases where sod or seed is installed at the end of the construction season and is not inspected at 45 days due to weather, inspections will generally be

conducted the following spring to ensure that the lawn has established. It will be the Contractor's responsibility to notify the property to begin lawn maintenance. The notification process will be developed and accepted by IDEQ prior to the construction season and included in the Contractor's Quality Construction Plan (CQCP). Once proper notification has occurred, watering and maintenance will then be the responsibility of the property owner.

The Property Owner is responsible to mow the lawn once sod or grass seeding has been established. No mowing should occur for the first 21 to 30 calendar days, depending on condition. Clippings should be removed immediately following mowing to prevent dead spots in sod. No heavy or concentrated use of the new lawn should occur within the first 30 calendar days, including dogs.

The Contractor is responsible for weed control of installed sod, seed, or hydroseed grass areas through the 45 day watering period. Additional weed control by the Contractor may be requested by IDEQ. If weeds continue to be a problem, the Contractor will continue to control weeds through November 1 of the year the sod, seed or hydroseed was placed.

## 10.4 EMERGENCY REPAIRS

The IDEQ and the Contractor will provide designated contact personnel who will be responsible for first response to emergencies on a 24-hour basis when any remedial activities are presumed to have caused a problem. Action will be taken to stabilize or avert the damage within 24 hours of notification.

## 10.5 WARRANTY

### 10.5.1 General Property Warranty

Following a Forty-five calendar day period after installation of sod or grass seed, each property will be evaluated by IDEQ to determine if a satisfactory stand of grass is present. If IDEQ determines that the grass is not satisfactory, the Contractor will repair, replace, or take other appropriate measures to achieve that goal. If IDEQ approves the grass condition, the Contractor will be released from further grass related activities with the exception of possible weed control.

Each property will be mailed a warranty letter approaching the one year anniversary of remediation completion from the IDEQ. (See Appendix F). This letter describes the warranty between the property owner, the IDEQ and the Contractor. The homeowner is advised that the one year vegetation (plants and trees) warranty is about to expire and the two year warranty is in place for one more year. These letters remind the homeowners to call IDEQ if they are experiencing problems related to their remediation.

### 10.5.2 Residential Property Warranty

<u>Enhancement</u>

For residential properties where barrier enhancement activities occurred, the IDEQ will conduct inspections of those properties one year after completion of the work. If repairs are required that result from workmanship or material defects, including vegetation (see Section 10.5.1) the IDEQ will contact the Contractor. The Contractor will make necessary repairs, including plant replacement, as indicated in the warranty (Appendix E). The Contractor is not responsible for repairs that result from land use activities or improper maintenance activities conducted by the property owner.

Remediation

The general warranty provisions described in Section 10.5.1 are applicable to residential properties remediated at the direction of the IDEQ. The Contractor will make necessary repairs as indicated in the warranty (Appendix E).

### 10.5.3 Commercial Property Warranty

Commercial properties have additional warranty issues, beyond what is described in Section 10.5.1. The IDEQ will inspect areas that were seeded after one year to determine compliance with the 85% coverage requirement. If it is achieved after one year, no further site inspections are necessary and maintenance becomes the responsibility of the property owner. If 85% coverage is not achieved, the Contractor will inspect the property once per year for the next two years, or until the coverage requirement is met. If 85% coverage is not achieved after three years, the Contractor will reseed the area or take other appropriate actions. If weeds are observed in reseeded areas prior to attaining 85% coverage, the Contractor will utilize appropriate measures to remove the weeds. The Contractor will provide the IDEQ with documentation of the inspections and any resulting actions taken.

The Contractor will mitigate commercial areas exhibiting excessive erosion that are associated with remedial work conducted and not caused by the land use practices of the owner/tenant. The Contractor will place additional vegetation, surface water control measures or selective rock barrier placement as required to control erosion. Specific measures will be determined on a case-by-case basis.

The Contractor will make necessary repairs as indicated in the warranty (Appendix E).

### 10.5.4 Rights-of-Way Warranty

Rights-of-way have additional warranty issues, beyond what is described in Section 10.5.1. The Contractor will inspect areas that were seeded after one year to determine compliance with the 85% coverage requirement. If it is achieved after one year, no further site inspections are necessary and maintenance becomes the responsibility of the property owner. If 85% coverage is not achieved, the Contractor will inspect the property once per year for the next two years, or until the coverage requirement is met. If 85% coverage is not achieved after three years, the Contractor will reseed the area or take other appropriate actions. If weeds are observed in reseeded areas prior to attaining 85% coverage, the Contractor will utilize appropriate measures to remove the weeds. The Contractor will provide IDEQ with documentation of the inspections and any resulting actions taken.

The Contractor will mitigate ROW areas exhibiting excessive erosion are associated with remedial work conducted and not caused by the land use practices of the owner/tenant. The Contractor will place additional vegetation, surface water control measures or selective rock barrier placement as required to control erosion. Specific measures will be determined on a case-by-case basis.

The Contractor will inspect ROW areas capped with gravel and rock barriers annually for up to two years. The Contractor will report their findings from these inspections to IDEQ. If the first annual inspection indicates that no repairs are necessary, maintenance will become the responsibility of the owner. If this first inspection identifies the need for repairs, the Contractor will make the necessary repairs, if the repairs are associated with remedial work conducted and not caused by owner/tenant land use practices. If repairs are made after the first year, another inspection will be required for the second year. The Contractor will report their findings from these inspections to IDEQ. Where excessive erosion occurs, the Contractor will place additional vegetation, surface water control measures or selective rock barrier placement as required to control erosion. Vegetation encroachment

or invasion into the barrier is not considered a disturbance to the barrier and will not be addressed by the Contractor. Specific measures will be determined on a case-by-case basis.

The Contractor will make necessary repairs as indicated in the warranty (Appendix E).

# 11.0 OPERATIONS AND MAINTENANCE

When all work and work products have met their warranty requirements, the property owners are responsible for the long-term maintenance of the barriers installed on their property. Property owners assume responsibility for the installed barriers at the time of notification by IDEQ and receipt of the Barrier Maintenance Plan (see Section 12.5).

The Institutional Control Program (ICP), as instituted in the Basin in September 2007, has been established to ensure the long-term protectiveness of the remediation activities defined by this RDR. The ICP will assist property owners when planning and conducting activities that impact barriers installed as part of the remedial work overseen by the IDEQ. In so doing, the ICP issues free-of-charge permits to property owners which designate proper soil handling, pick-up, and disposal methods and provide guidelines and requirements to ensure the long-term integrity of barriers installed as part of the residential, commercial and ROW remediation work. Owners of properties remediated by the IDEQ are required to comply with the requirements of the ICP.

Once properly closed, private domestic water supply wells are not expected to require additional operations and maintenance. A drinking water filter program was initiated in the Basin by the EPA in 1999. The purpose of this program is to reduce levels of metals in residences with contaminated private wells where the well is not closed, but still utilized as a drinking water source. The IDEQ will continue this program until further notice. Maintenance activities for this program include filter replacement every 6 months (typically January and July) and periodic monitoring activities (June and December) to ensure the filters continue to function properly. Monitoring activities will be conducted in accordance with procedures identified in the QAPP (see Appendix A-2).

# 12.0 FUTURE DELIVERABLES (PLANS & REPORTS)

For residential property, commercial property, and ROW cleanup activities in the Basin, the following plans and reports will be prepared by the Contractors, or IDEQ or their designated representative.

## 12.1 PROJECT MANAGEMENT

### 12.1.1 Non-Compliance Forms and Change Orders

The Non-Compliance Form (NCF) is a mechanism for the IDEQ or their designated representative to notify the Contractor of non-compliance with the contract specifications and Remedial Design Report during construction. Refer to Appendix I for these forms.

In summary, the IDEQ will provide a brief description of the non-compliant activity or contract element. The Contractor will then have the number of hours or days specified on the non-compliance form to complete the corrective action. The Contractor will perform the necessary activities to correct the non-compliance at no additional cost to the project. The Contractor will present their proposed action on the NCF for IDEQ review and approval. The IDEQ will maintain a Non-Compliance Log.

A Change Order is a mechanism for the IDEQ to make modifications of plans, designs, and schedules. Refer to Appendix I for this form. In general, the Contractor will conduct the work identified in the Change Order at the approved cost and/or schedule authorized on the Change Order. A Change Order must be authorized prior to the Contractor executing any work on the Change Order. The IDEQ or his designated representative will maintain a Change Order Log for the project. In the event that the IDEQ determines that modification of an approved plan, design, or schedule is

necessary, a written Change Order including, but not limited to, the following information will be provided by the IDEQ Project Coordinator or designated representative:

- General description of and purpose for the modification;
- Justification, including any calculations, for the modification;
- Actions to be taken to implement the modification, including any actions related to subsidiary documents, milestone events, or activities affected by the modification;
- Cost considerations; and
- Recommendations.

### 12.1.2 Contractor Project Records

The Contractor will ensure that the project requirements outlined in the property specific scope of work are completely, safely and correctly executed to the satisfaction of the IDEQ. All activities performed under the Contractor's program must be accomplished in a manner that displays competence with construction and remedial operations and display a high regard for public and private properties.

The Contractor will complete and maintain project records. The Contractor will complete a daily work report (see Appendix I) to document work conducted on each property and deliver it to the IDEQ on a daily basis. The daily reports will indicate the following information:

- summary of progress for the day, including Contractor equipment and labor utilization, and subcontractor utilization
- issues or concerns generated that day
- forecast for the next day's activities

The Contractor will conduct quality control activities in accordance with their approved Contractor Quality Control Plan (CQC Plan). The Contractor is responsible for QC of work. Applicable CQC tests will be conducted by the Contractor's Quality Control Officer and CQC test reports will be prepared and submitted to IDEQ within 5 calendar days of completion of the test. CQC test reports

will include the following:

- Project information, including contract number, date, report number, location, weather, etc.
- Source identification.
- Quality control test method utilized and results.
- Remarks.
- Contractor's verification of complete and correct report.

Applicable CQC inspections will be conducted by the Contractor's Quality Control Officer and reports will be prepared and submitted to IDEQ with the Daily Report. Reports will include the following:

- Project information, including date, report number, location, weather, etc.
- Quality control inspections and results.
- Material acceptance or rejection information for delivered and received material from suppliers.
- Remarks.
- Contractor's verification for complete and correct report.

The Contractor will complete an Annual Construction Completion Report summarizing their activities. The report will include the following:

- Pre and post construction site photographs.
- Start and stop dates by property
- Estimated volumes of material removed
- Estimated square footage of material removed
- Repositories used and volumes placed in each
- Total cost of the project
- Average haul distance for the project

- Soil and gravel analysis data (physical and chemical)
- Quality Control tests and results
- Health and Safety monitoring summary
- Description of health and safety incidents and steps taken to prevent additional accidents
- Initial cost estimate, change order and invoiced amounts by property
- Identification and address of suppliers
- A description of disputes with other entities and a summary of the resolution.
- Volumes of different materials used (soil, gravel, etc)
- Lessons learned for season

The Contractor will deliver the final report to the IDEQ within 45 days of completion of the construction season.

## 12.2 REMEDIAL DESIGN

This RDR may be revised through publication of subsequent versions.

The IDEQ will prepare a Construction Quality Assurance Plan (CQA Plan). This plan will identify quality assurance activities, duties, authority and responsibilities for completion of remediation actions on Basin property. The CQA Plan will compliment the RDR.

## 12.3 REMEDIAL ACTION

The IDEQ will prepare an *Annual Basin Property Remediation Work Plan* as described below. Each year, the IDEQ will prepare a work plan outlining the proposed remediation activities to be completed during the next construction season. Barring unusual weather, the construction season will generally start on April 15 of each year. The work plan will address all residential property,

commercial property and rights-of-way remediation activities to be completed within the Coeur D'Alene Basin. The *Annual Basin Property Remediation Work Plan* will provide the following:

- An overall description of the work to be performed with cross-references to other documents, if applicable, containing more specific details.
- The technical approach for undertaking, monitoring, and completing the work.
- A description of deliverables and milestones.
- A general construction schedule.
- Sampling and analysis requirements, including field verification programs.
- Construction O&M requirements.
- Plan for integrating, coordinating, and communicating with EPA and other government officials.
- Quality assurance measures.
- Additional health and safety measures.

The Basin property sampling program will work in conjunction with the remediation program. Sampling and analysis will be conducted in accordance with the Sampling and Analysis Plan and Quality Assurance Project Plan (see Appendix A-2).

"High-Risk" remediation candidate properties, as defined in Appendix D, will be added to the sampling program as the list of these properties is received from the EPA or PHD. To help facilitate efficient scheduling of remediation activities, the IDEQ will be notified as soon as a high-risk property has been identified. IDEQ will make best efforts to identify all high-risk yards prior to September 1st or upon receipt of summary screening data from PHD.

The IDEQ will prepare a record drawing for each Basin property where remediation activities were required. The record drawing will be used as a permanent record to show site-specific conditions and remediation activities completed. The record drawing will be incorporated into the Annual Construction Completion Reports (see section 12.4). A copy of the record drawing, along with any other pertinent information, will also be provided to the property owner. A copy of the record drawing is also provided to the ICP.

## 12.4 ANNUAL CONSTRUCTION COMPLETION REPORT

The IDEQ will summarize construction activities completed during a given construction season in an *Annual Construction Completion Report.* The report will contain a complete listing and description of construction activities associated with Basin property remediation work that were completed during the previous construction season.

These reports will be prepared by IDEQ by February of the following year.

## 12.5 BARRIER MAINTENANCE PLAN

The IDEQ will prepare a Barrier Maintenance Plan for property being remediated under this RDR. The Barrier Maintenance Plan will be provided to the property owner at the completion of remediation work. A generic Barrier Maintenance Plan is provided in Appendix F. The IDEQ will explain the purpose for maintaining the barriers and provide a copy of the Barrier Maintenance Plan to the property owner.

## 12.6 PROPERTY DISCLOSURE

The IDEQ will provide information pertaining to the owner's property to assist them in complying with disclosure requirements. These will include the following:

- Record drawing,
- Access Agreement,
- Barrier Maintenance Plan,
- ICP pamphlet,
- Sampling results.

# 13.0 REMEDIAL ACTION AREA CLOSEOUT

Remedial action area closeout activities and procedures will be determined and included in the RDR at a later date.

# 14.0 REFERENCES

IDAPA 37.03.09. Well Construction Standard Rules. Prepared by the State of Idaho. July 1, 1993.

IDEQ 2006. Catalog of Storm water BMPs for Idaho Cities and Counties. http://www.deg.state.id.us/water/permits_forms/permitting/catalog_bmps.cfm

IDWR 1991. Well Abandonment. Prepared by the Idaho Department of Water Resources. January 1991.

MFG 1994a. Bunker Hill Superfund Site Final Residential Yards Remedial Design Report. Prepared for ASARCO Inc., Hecla Mining Company, Sunshine Mining Company. March 1994.

MFG 1994b. Bunker Hill Superfund Site Final Commercial Property Remedial Design Report. Prepared for ASARCO Inc., Hecla Mining Company, Sunshine Mining Company. March 1994.

MFG 1994c. Bunker Hill Superfund Site Final Rights-of-Way Remedial Design Report. Prepared for ASARCO Inc., Hecla Mining Company, Sunshine Mining Company. March 1994.

MFG 1994d. Bunker Hill Superfund Site Final Water Well Closure Remedial Design Report. Prepared for ASARCO Inc., Hecla Mining Company, Sunshine Mining Company. January 1994.

OSHA 2006. OSHA Construction Industry Safety and Health Standards (Code of Federal Regulations, Title 29, Part 1926).

OSHA 2006. OSHA General Industry Safety and Health Standards (Code of Federal Regulations, Title 29, Part 1910).

TerraGraphics 2002. Presentation of most recent child blood-lead data to the Bunker Hill Task Force, October 2002.

TerraGraphics 2000. Coeur d'Alene Basin Human Health Risk Assessment. Prepared for the Idaho Department of Health and Welfare, Division of Health under the direction of the Division of Environmental Quality. June 2000.

USEPA 2002. The Bunker Hill Mining and Metallurgical Complex, Operable Unit 3, Record of Decision. September 2002.

# APPENDIX A

Bunker Hill Mining and Metallurgical Complex
Operable Unit 3

## APPENDIX A-1
May 18, 2004 Clean Arsenic Level
Technical Memorandum

## APPENDIX A-2
Quality Assurance Project Plan (QAPP)
For Property Sampling in the
Coeur d'Alene River Basin of Idaho

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# APPENDIX A-1
# May 18, 2004 Clean Arsenic Level Technical Memorandum

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# Technical Memorandum

**Date:** May 18, 2004

**To:** Mark Stromberg, IDEQ, Kellogg
Scott Peterson, IDEQ, Kellogg
Rob Hanson, IDEQ, Boise

**From:** Susan Spalinger, TerraGraphics, Moscow
Michael McCurdy, TerraGraphics, Kellogg

**Subject:** **Clean Soil Criteria for Arsenic – Action Item #3**

Based on the January 14, 2004 meeting between IDEQ and EPA regarding the yard remediation program for Operable Unit 3 (Basin) of the Bunker Hill Mining and Metallurgical Complex Superfund Site, several action items were identified. TerraGraphics was assigned completion of various action items by IDEQ. The purpose of this technical memorandum is to discuss the modification to the clean soil criteria for arsenic in the Basin.

The current Remedial Design Report (RDR) for Operable Unit 3 states that clean replacement material should average less than 25 mg/kg arsenic. This "clean" level was based on backfill data from previous years (1994-1998) where average concentrations for arsenic ranged from 5 mg/kg to 27 mg/kg in gravel and from 6 mg/kg to 20 mg/kg in top soil (TerraGraphics Feb. 28, 1999 memorandum to LRRG). These values were consistent with an estimated 22 mg/kg ($90^{th}$ %-tile) background level determined for the mining district extending from Montana to Coeur d'Alene Lake (Table 2-3, HHRA ). In 2003, the average arsenic concentration in backfill was 25 mg/kg, with individual sample concentrations ranging from 13 mg/kg to 40 mg/kg. Although not inconsistent with background concentrations in the more highly mineralized zones, these values may indicate a slight amount of local contamination.

The Remedial Action Objectives (RAO) with respect to arsenic in residential yard soils was established in the Basin Record of Decision, and was selected based on risk-based preliminary remediation goals (PRG). Risk-based PRGs are intended to be protective of human health and were calculated in the *Human Health Risk Assessment for the Coeur d'Alene Basin Extending from Harrison to Mullan on the Coeur d'Alene River and Tributaries* (HHRA) (TerraGraphics and URS 2001). Potential PRGs noted in Table 5-6 in the HHRA were 35 mg/kg for 0-6 year-old children exposed to arsenic in residential soil (ingestion and dermal, non-cancer), 123 mg/kg child/adult lifetime (ingestion and dermal, non-cancer) and 64 mg/kg (ingestion and dermal, $10^{-4}$ cancer). Observed soil arsenic levels ranged from 17 mg/kg to 40 mg/kg across communities in the Basin with $95^{th}$ %-tile concentrations of 21 to 51 mg/kg.

Subsequently, a cleanup action level of 100 mg/kg was selected for residential yards. All yards with soil levels greater or equal to 100 mg/kg arsenic in soil will be removed and replaced with a clean soil barrier. Yards with soil concentration values between 60 mg/kg and 99 mg/kg are re-sampled and the action based on the higher result. Clean material criteria were established in the RDR as noted above.

Because last year's clean soil average arsenic value was near the criteria level, IDEQ would like to slightly increase the clean soil criteria in order to take advantage of local soil and gravel sources as remediation continues. To maintain a reduced risk to children in the Basin, but increase the clean soil arsenic criteria, it is proposed the clean soil criteria for arsenic be modified to "clean replacement material should average less than 35 mg/kg arsenic, with no single sample greater than 45 mg/kg." These values are consistent with projected post-remedial arsenic soil concentrations and the PRGs used to develop the cleanup criteria.

# APPENDIX A-2
# Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) For Property Sampling in the Coeur d'Alene River Basin of Idaho

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# Final

# Sampling and Analysis Plan (SAP) / Quality Assurance Project Plan (QAPP) for the 2011 Property Sampling in the Coeur d'Alene River Basin of Idaho

Prepared for:
Idaho Department of Environmental Quality
1005 West McKinley Avenue
Kellogg, ID 83837

Prepared by:
TerraGraphics Environmental Engineering, Inc.
108 West Idaho Avenue
Kellogg, ID 83837
(208) 786-1206

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**Final**

# Sampling and Analysis Plan (SAP)/ Quality Assurance Project Plan (QAPP) for the 2011 Property Sampling in the Coeur d'Alene River Basin of Idaho

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April 4, 2011

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**APPROVAL FORM**

Approved by:

DATE: 3/2/11

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – PROJECT MANAGER
Bill Ryan

DATE: 3/3/2011

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGIONAL QUALITY ASSURANCE OFFICER
Ginna Grepo-Grove

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IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY – PROJECT MANAGER
Rob Hanson, Scott Peterson, or Bill Hudson

DATE: 3/2/11

TERRAGRAPHICS - PROJECT MANAGER
Susan Spalinger

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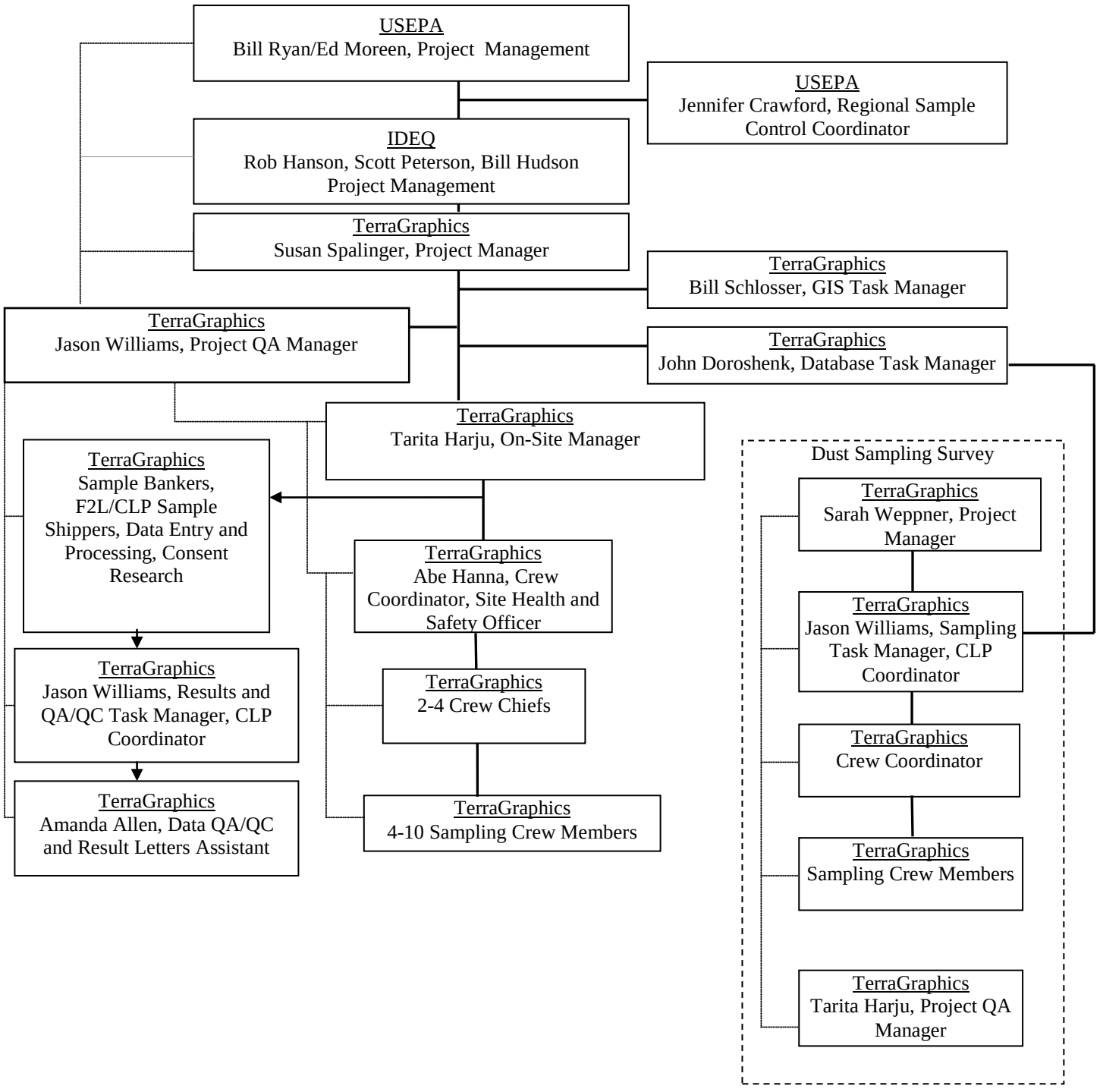
## LIST OF ACRONYMS

| | |
|---|---|
| ADQ | Audit of Data Quality |
| CCS | Contract Compliance Screening |
| CERCLIS | Comprehensive Environmental Response, Compensation and Liability Information System |
| CLP | Contract Laboratory Program |
| COC | Chain-of-Custody |
| CRQL | Contract Required Quantitation Limit |
| DART | Data Assessment Rapid Transmittal |
| DQO | Data Quality Objective |
| EDD | Electronic Data Deliverable |
| EXES | Electronic Data Exchange and Evaluation System |
| GPS | Global Positioning System |
| HHRA | Human Health Risk Assessment |
| HUD | United States Department of Housing and Urban Development |
| ICP | Institutional Controls Program |
| ICP-AES | Inductively Coupled Plasma-Atomic Emission Spectroscopy |
| IDEQ | Idaho Department of Environmental Quality |
| LCS | Laboratory Control Sample |
| LHIP | Lead Health Intervention Program |
| MCL | Maximum Contaminant Level |
| MS/MSD | Matrix Spike/Matrix Spike Duplicate |
| NRC | National Research Council of the National Academies |
| NIST | National Institute of Standards and Technology |
| NPL | National Priorities List |
| OSHA | Occupational Safety and Health Administration |
| OU | Operable Unit |
| PHD | Panhandle Health District |
| PRP | Potentially Responsible Party |
| QA | Quality Assurance |
| QC | Quality Control |
| QAPP | Quality Assurance Project Plan |
| RDR | Remedial Design Report |
| ROD | Record of Decision |
| ROW | Right-of-Way |
| RPD | Relative Percent Difference |
| SAP | Sampling and Analysis Plan |
| SDG | Sample Delivery Group |
| SOP | Standard Operating Procedure |
| SOW | Statement of Work |
| SRM | Standard Reference Material |
| SVL | SVL Analytical, Inc., State of Idaho's contract laboratory |
| TR | Traffic Report |
| UMG | Upstream Mining Group |
| USEPA | United States Environmental Protection Agency |

# Section 1.0 Project Management

This sampling effort is being conducted as part of a cooperative agreement between the State of Idaho Department of Environmental Quality (IDEQ) and the United States Environmental Protection Agency (USEPA) to identify potential human health risks from lead (Pb) and arsenic (As) contamination in community soils and dust, and lead, arsenic, and cadmium (Cd) contamination in residential private well water. The following sections provide a list of key project personnel and their responsibilities, an explanation of the history and issues of concern, project schedules, data quality objectives, sample collection methods, oversight of sample collection and data validation procedures, and data validation and use.

## 1.1 Project/Task Organization



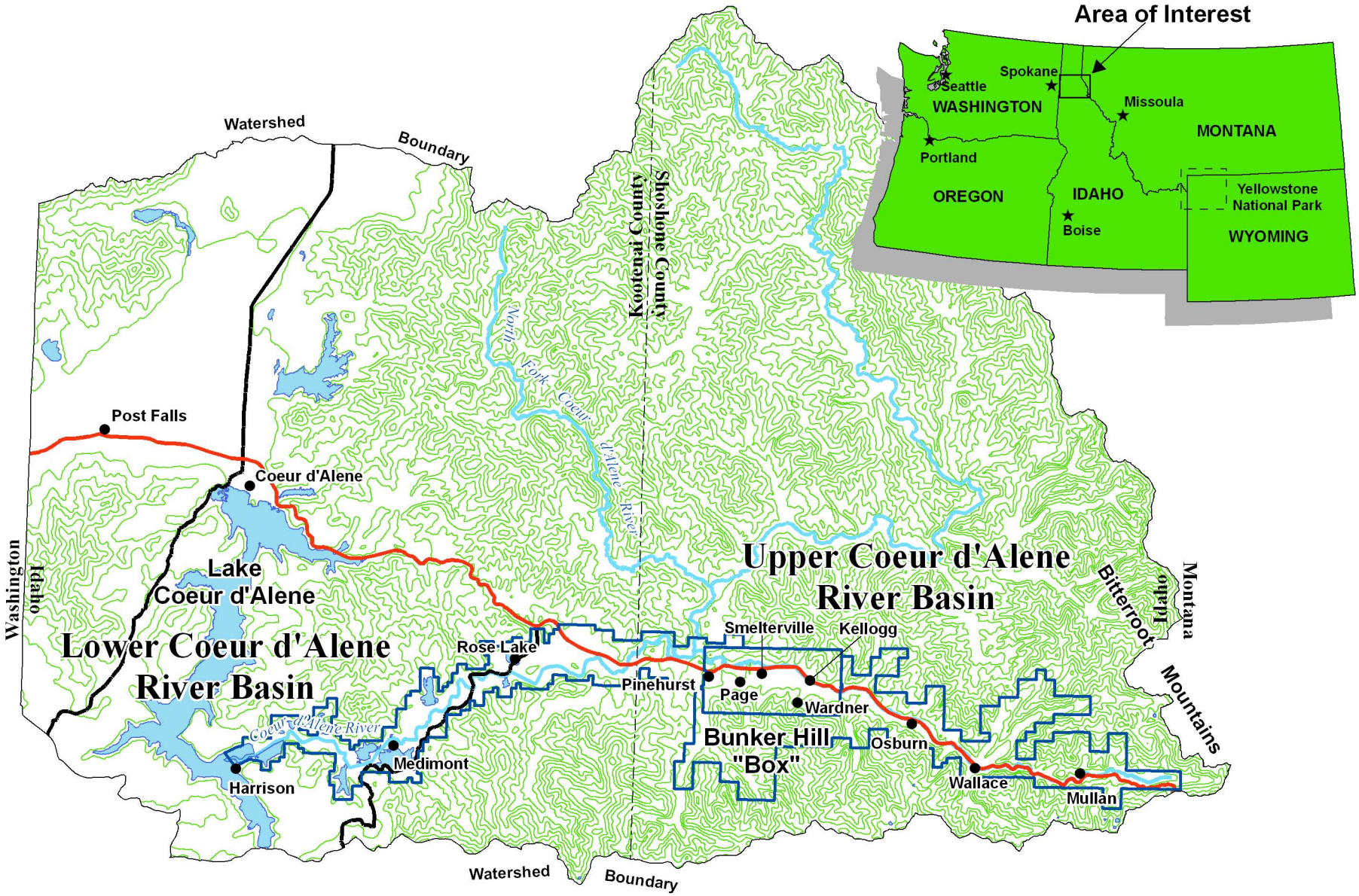
## 1.2 Problem Definition/Background

The Coeur d'Alene River Basin (the Basin) extends across Idaho from the Montana border on the east to the Washington border on the west. The Bunker Hill Mining and Metallurgical Complex Superfund Facility, located in the Basin, was listed on the National Priorities List (NPL) in 1983. The NPL facility has been assigned Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) identification number IDD048340921. The site includes mining-contaminated areas in the Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas, as well as the 21-square-mile area, referred to as the "Box," that surrounds the historic smelting operations at the Bunker Hill complex. The USEPA has identified three operable units (OUs) within the Basin: Operable Unit 1 (OU1), the populated areas of the Box; Operable Unit 2 (OU2), the non-populated areas of the Box; and Operable Unit 3 (OU3), the areas of mining-related contamination outside the Box in the broader Basin. Actions in this Sampling and Analysis Plan (SAP)/ Quality Assurance Project Plan (QAPP) are being conducted pursuant to the OU3 Record of Decision (ROD).

The upper Basin is contained within a steep mountain canyon of the South Fork of the Coeur d'Alene River and adjacent tributary gulches (Figure 1). This area is the heart of the Coeur d'Alene mining district, a major producer of silver, lead, zinc, and other metals beginning in the late 1880s. Historic mining practices resulted in the widespread heavy metals contamination that threatens both human health and the environment.

Ongoing actions to protect human health have included intervention programs and removal actions. The Lead Health Intervention Program (LHIP), administered by the Panhandle Health District (PHD), provides personal health and hygiene information to help reduce exposure to metals. Services include educational programs, health monitoring programs, yard soil and house dust sample collection, and nursing follow-up visits to households.

The ROD for the Coeur d'Alene Basin (USEPA 2002a), the Human Health Risk Assessment (HHRA) (TerraGraphics and URS 2001), and the National Academy of Sciences' review of the Basin entitled, *Superfund and Mining Megasites – Lessons from the Coeur d'Alene River Basin* (NRC 2005), provide excellent background and historical information on sampling and cleanup activities that have occurred in the Basin, as well as justification for further study.

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- Towns
- Interstate Highways
- Major Highways
- Rivers and Streams
- ICP Administrative Boundary
- Elevation Contours

Figure 1

# Site Location Map

## 1.3 Project/Task Description and Schedule

The objectives of property sampling in the Coeur d'Alene Basin are i) to identify properties that are eligible for soil remediation based on lead and arsenic concentrations, ii) to assess the effectiveness of remedies, and iii) to identify situations when intervention may be warranted due to high lead or arsenic dust levels. Removal of the exposure source will protect human health, particularly that of children six years of age or younger and/or pregnant women. This population is considered "high risk" and will receive sampling priority throughout the project duration. Two sampling efforts are described in this SAP/QAPP: soil, dust, and water sampling; and targeted house dust sampling. The targeted house dust sampling effort will collect dust mat samples and the majority of vacuum samples (Section 1.3.2). As opportunities arise, vacuum samples will also be collected during the soil, dust, and water sampling effort in order to acquire additional dust data from residences that are not visited during the house dust sampling effort (Section 1.3.1).

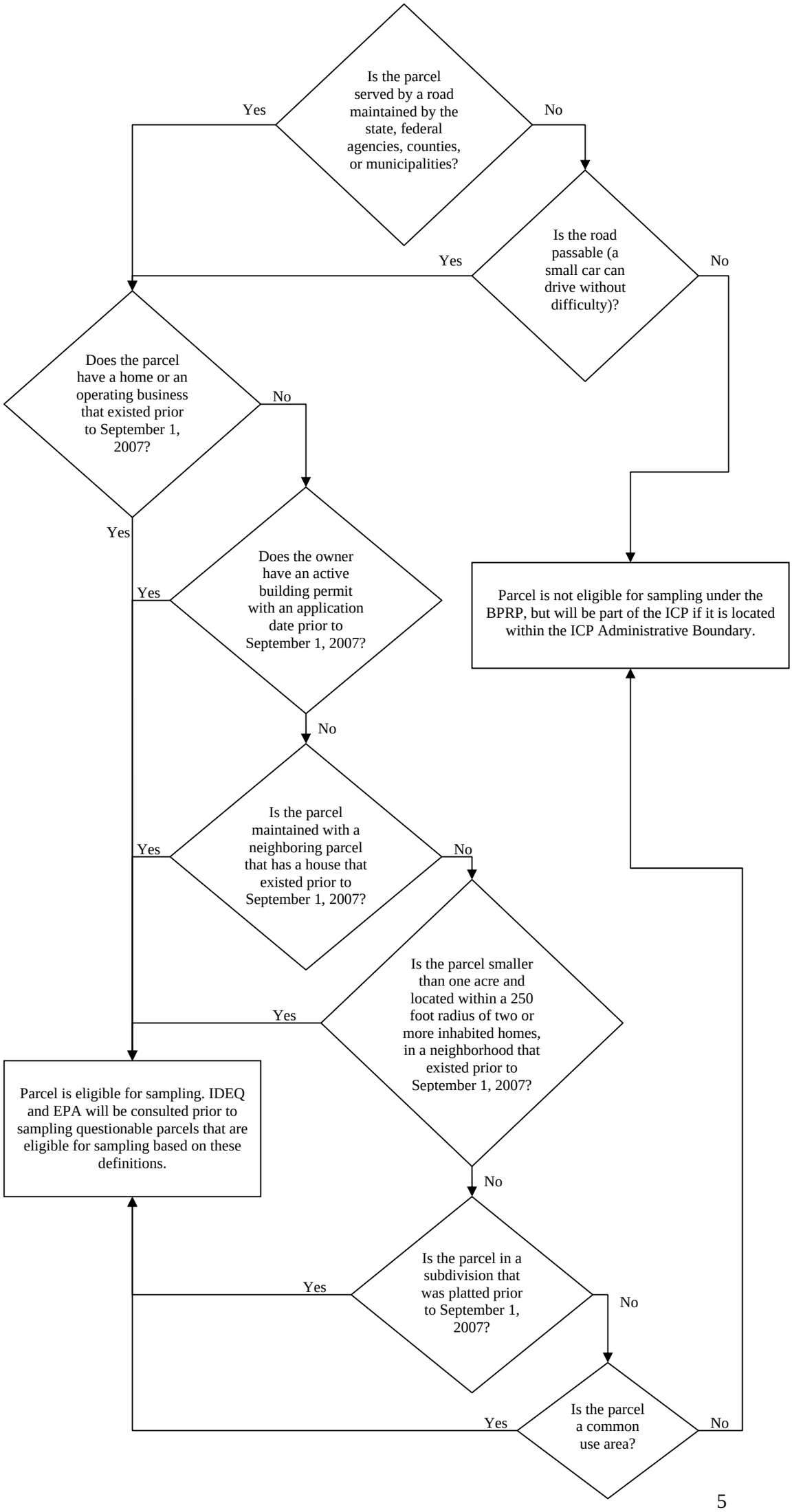
Owners of properties to be sampled will be contacted either by telephone or in person at home. If a property owner cannot be contacted or lives out of town, a consent form will be sent to his or her mailing address with a stamped envelope to return the form. High risk homes are identified either through child questionnaire information or via the voluntary blood lead screening program.

### *1.3.1 Soil, Dust, and Water Sampling*

Sampling is anticipated to occur at approximately 175 to 225 properties (385 to 495 property equivalents) and approximately 80 miles of unpaved roads (422,400 linear feet; 63 property equivalents) in the upper and lower Coeur d'Alene River Basin for the soil, dust, and water sampling effort during the 2011 sampling season. The larger number of properties will be sampled if weather permits and if homeowners are available to sign sampling consents. The use of "property equivalents" standardizes differing property sizes by using the average number of holes dug per property based on sample collection in previous years. One property equivalent is equal to 27 holes, based on the average number of holes dug per property in 2004 and 2005. Soil samples will be collected from rural city/county dirt roads, unpaved urban alleyways, rights-of-way (ROW), residential properties, common use areas, commercial properties, and vacant lots. Figure 2 illustrates the decision process to determine whether or not a property is eligible for sampling.

Typical areas of a residential property that are sampled are the yards, driveways, child play areas, and other distinct areas such as flowerbeds, parking areas, and gardens. Soil samples will be collected from four different depth intervals: 0-1 inch (Level A), 1-6 inches (Level B), 6-12 inches (Level C), and 12-18 inches (Level D). Vegetable gardens will be sampled to a depth of 24 inches (Level E). A dust sample will be collected from a resident's personal vacuum cleaner if available at the time of soil sampling. If a home's drinking water is served by a private well, water samples will be collected. First-draw and purged water samples from the kitchen tap will be collected and analyzed for total arsenic, cadmium, and lead.

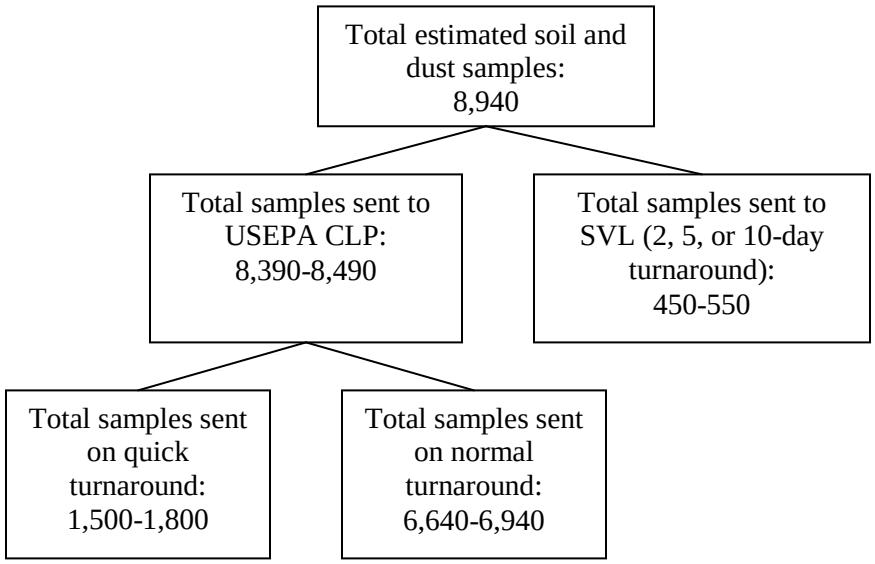
**Figure 2 Determination of Sampling Eligibility**



Based on soil sample collection conducted to date, approximately 16 soil samples per property equivalent will be collected during a given field season. As part of the soil, dust, and water sampling effort, it is estimated that a total of approximately 8,920 soil samples (based on the median between 385 and 495 property equivalents plus 63 unpaved road property equivalents), 20 to 30 dust samples, and 220 water samples will be collected in 2011; these totals include quality assurance (QA)/ quality control (QC) samples.

All soil and dust samples will be sieved to -80 mesh by the State of Idaho's contract laboratory SVL analytical (SVL). Most samples will be sent to the USEPA Contract Laboratory Program (CLP) for analysis of lead and arsenic. Figure 3 provides the estimated number of soil and dust samples, where they will be sent for analysis, and their anticipated analytical turnaround times.

**Figure 3 Sample Analysis and Turnaround Time Estimates**




Some soil samples will require quick turnaround analysis. Quick turnaround samples will come from high risk properties and remediation targets, and/or will be additional samples or resamples. CLP laboratories will provide results to USEPA for samples requiring quick turnaround within six calendar days of receipt of sieved samples. For normal turnaround samples, the laboratories are contracted to provide results to USEPA within three weeks. Upon data receipt, USEPA will conduct initial data validation. Approximately five days after receipt of the data, USEPA will deliver the data electronically to TerraGraphics Environmental Engineering, Inc. (TerraGraphics) personnel, who will perform data QA/QC and summary after receipt of any relevant hard copy data validation reports from USEPA.

Each homeowner will receive a letter explaining their property soil, water, and/or dust sampling results. A data summary report will be generated for all samples collected in the 2011 season.

Figure 4a summarizes the schedule of tasks and milestones for the soil sampling effort.

### *1.3.2 Targeted House Dust Sampling*

In addition to the dust samples collected as part of the soil, dust, and water sampling effort, approximately 360 homes are anticipated to be sampled in the separate, targeted house dust sampling effort. This separate sampling effort specifically targets high risk homes and homes that have been or will be remediated. High risk homes will be identified through the LHIP and the soil sampling effort described above. A carpeted floor mat for dust collection will be placed at each home for approximately three to four weeks and vacuumed in a special laboratory to collect the dust retained on the mat. Vacuum bag samples are also collected from approximately 75% of the homes that participate in the dust mat program, based on past sampling efforts. As a result, an estimated 675 dust samples will be collected (360 floor mat samples, 270 vacuum bag samples, and 45 QA/QC samples). The dust samples will be sent to SVL for sieving and then to CLP for lead and arsenic analysis, unless they contain a low dust mass (less than 1.0 gram). Based on previous years' data, about 30% of the dust samples are low mass; those will be analyzed by SVL for lead and arsenic.

Figure 4b summarizes the schedule of tasks and milestones for the dust sampling efforts. Table 1 summarizes the estimated number of soil, dust, and water samples for 2011.

## Table 1 Sample Handling and Estimated 2011 Sample Numbers for Soil, Dust, and Water Sampling

| Parameter | Matrix | Anticipated No. of Samples [3] | Anticipated No. of Samples per Weekly Submission [3] | Preservation Technique | Sample Container and Volume Required | Maximum Holding Times |
|---|---|---|---|---|---|---|
| Arsenic & Lead | Soil/Sediment/ Dust screen - 80 mesh[1] | 8,940 (675 – house dust survey)[4] | 200-300 | NA | self-closing plastic bag or twist-closing plastic bag | 6 months |
| Total Arsenic, Lead, Cadmium (Rinsate & Field Blanks, Arsenic and Lead only) | Water[2] | 220 (10 – house dust survey)[4] | 3-8 | Nitric Acid pH<2 | 1-liter polyethylene bottle | 6 months |

[1] Soil/Dust samples will be screened by SVL and analyzed by a USEPA CLP Laboratory or SVL.
[2] Water samples will be sent to SVL for analysis.
[3] Anticipated to begin in April 2011. Numbers include field QA/QC samples and samples sent to CLP and SVL on quick turnaround. Dust mat and vacuum samples collected from the house dust survey will be sent after dust mat extraction and sieving has occurred.
[4] Anticipated number of samples for the house dust survey is in addition to the anticipated number of samples for the soil sampling effort.

**Figure 4a Task Schedule and Milestone Chart for Soil Sampling**

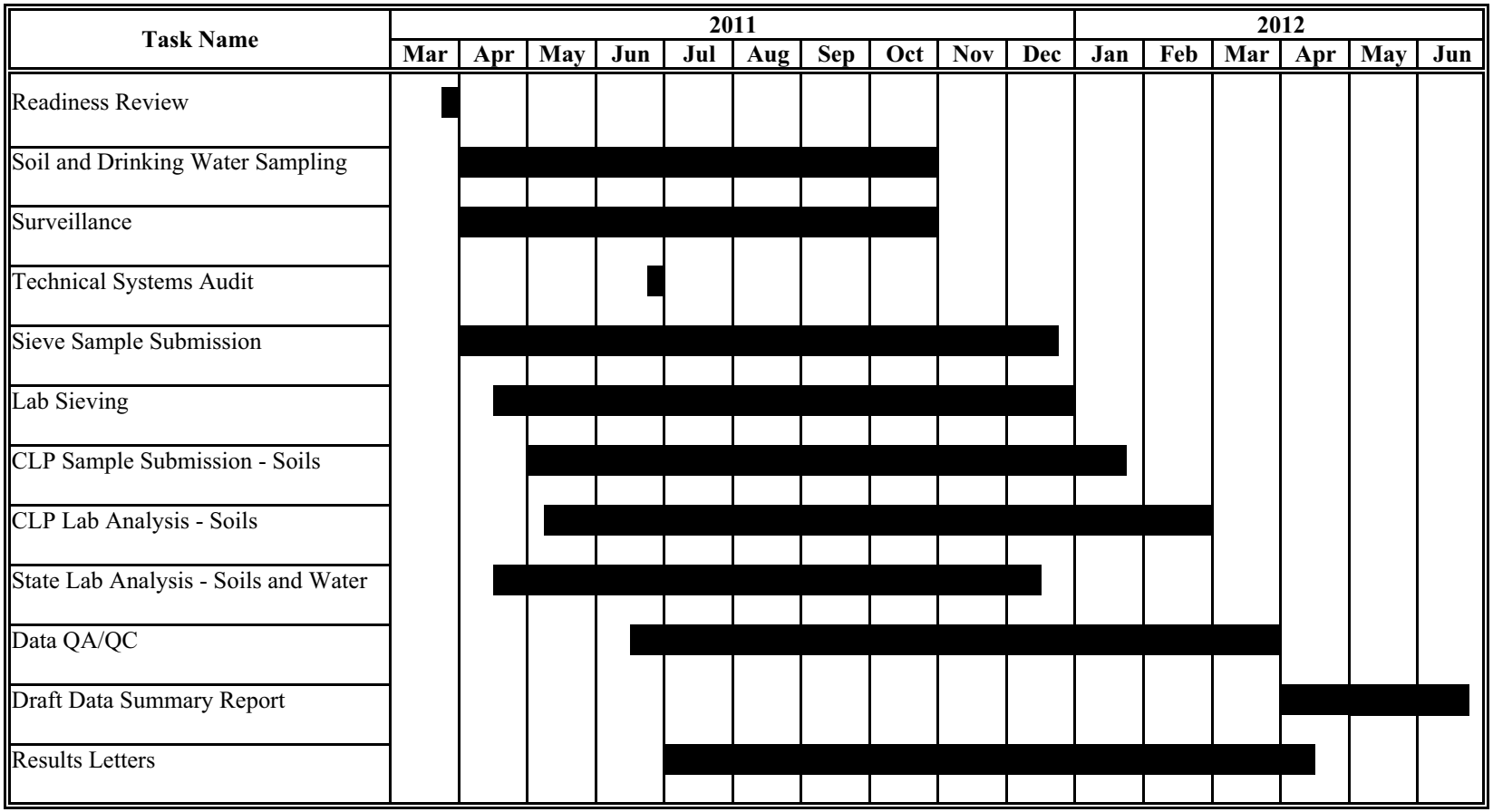
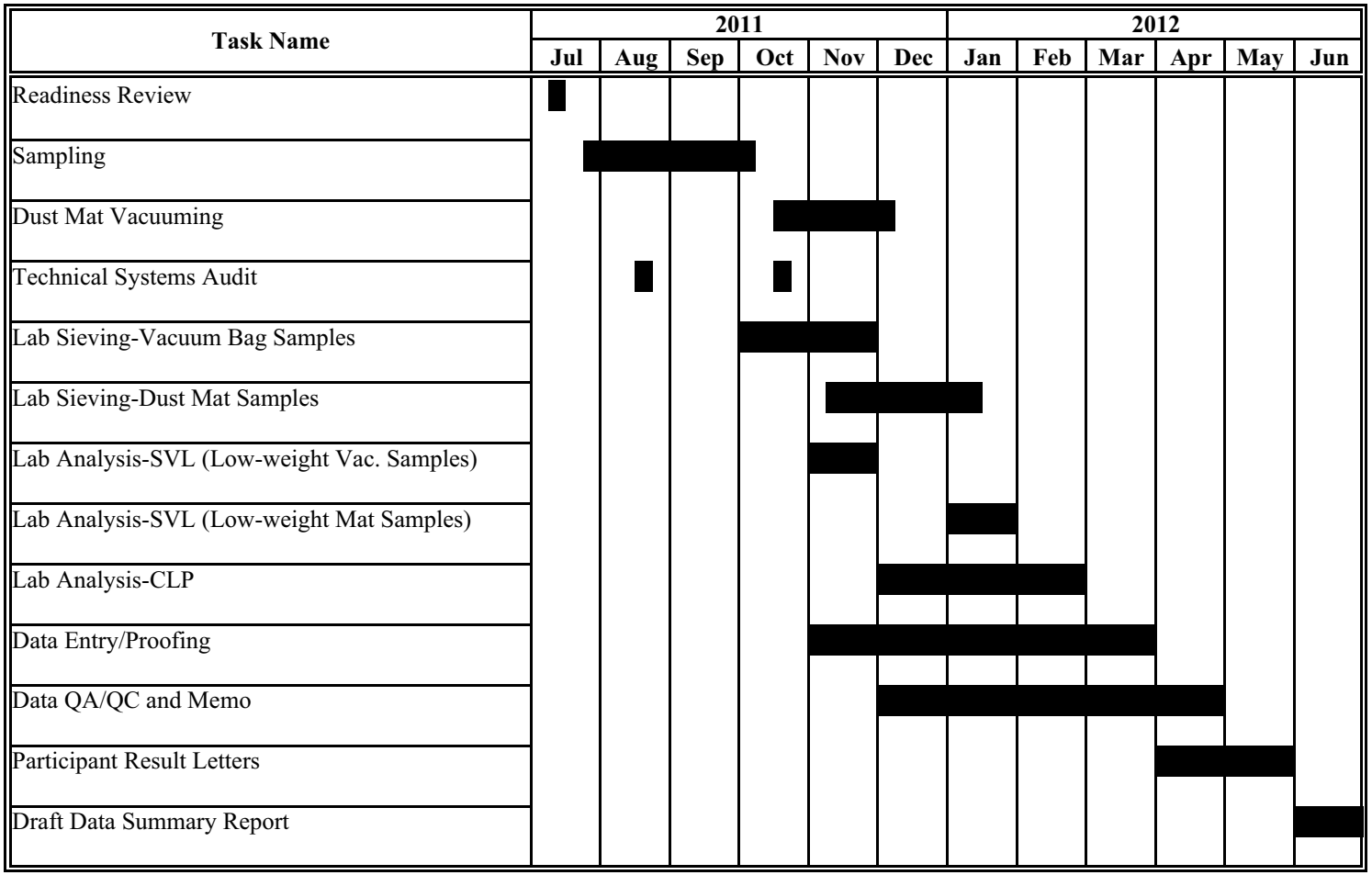


**Figure 4b Task Schedule and Milestone Chart for Dust Sampling**



## 1.4 Data Quality Objectives

Consideration of data quality begins with the identification of data uses and data types. The USEPA Data Quality Objective (DQO) process used as a model for this sampling is described in *USEPA Guidance for the Data Quality Objectives Process USEPA QA/G-4* (USEPA 2006). This document outlines general processes that can be applied to any environmental investigation. Figure 5 provides an overview of the DQO process for this sampling and is followed by a detailed description of each step.

## Figure 5 Data Quality Objectives Flow Chart

1. **State the Problem** – (Section 1.4.1) *Locate residential properties with soil lead or arsenic concentrations exceeding the action levels for cleanup, especially high risk properties. Also, locate properties using private drinking water supplies containing lead, arsenic, or cadmium levels above the maximum contaminant levels (MCLs) defined in the OU3 ROD (USEPA 2002a).*

2. **Identify the Decision** – (Section 1.4.2) *Does the property or parts of the property require remediation? Is an alternative drinking water supply needed?*

3. **Identify Inputs to the Decision** – (Section 1.4.3) *Compare soil lead and arsenic concentrations to the action levels defined in the ROD. Compare lead, arsenic, and cadmium water concentrations to the MCLs defined in the OU3 ROD (USEPA 2002a.)*

4. **Define the Study Boundaries** – (Section 1.4.4) *Coeur d'Alene River Basin in northern Idaho; predominantly within the Institutional Controls Program (ICP) Administrative Boundary, and generally within 1.5 mile of the floodplain.*

5. **Develop a Decision Rule** – (Section 1.4.6) *If the soil lead concentration exceeds 1,000 mg/kg or arsenic concentration exceeds 100 mg/kg, soil will be removed and replaced. If the soil lead concentration ranges between 700 mg/kg and 999 mg/kg, barrier enhancement activities will occur. If initial lead or arsenic concentrations range between 900 mg/kg and 999 mg/kg or 60 mg/kg and 99 mg/kg, respectively, the area will be sampled again. If the resample exceeds the appropriate action level, the area will be remediated or greened as needed. If concentrations of lead, arsenic, or cadmium exceed MCLs in drinking water from a private source, the problem will be addressed as part of the cleanup program and referred to IDEQ as soon as possible. House dust lead or arsenic concentrations will be used by PHD to assess potential exposure.*

6. **Specify Limits on Decision Errors** – (Section 1.4.7) *The two types of decision errors that are of importance include i) Type I errors, false positive conclusion and ii) Type II errors, false negative conclusion. For human health response actions, false negative conclusions should be avoided. Sample results will be compared to previously determined action levels for the Coeur d'Alene Basin.*

7. **Optimize the Design for Obtaining Data** – (Section 1.4.8) *A stratified grid sampling design with composite samples will achieve the DQOs described above. A stratified grid sampling design allows for sampling units to be selected on potential exposure areas and differing soil characteristics. Composite samples from the sampling units will provide an average concentration of an exposure area that may require a response action (i.e., removal). Additionally, composite samples reduce analytical costs and may provide a better estimate of the mean by providing more coverage (better representation) of the exposure area. Samples will be collected from any properties where residents are willing to participate. Once identified, properties will be sampled on a block-by-block basis throughout the towns, if possible, to reduce travel time, to minimize repeated trips to a neighborhood, and to better characterize a geographic area for future remediation work.*

### *1.4.1 State the Problem*

The goal of this project is to locate properties throughout the Coeur d'Alene River Basin that contain soil lead or arsenic concentrations that exceed action levels defined in the ROD, and/or utilize private drinking water supplies with lead, arsenic, or cadmium concentrations exceeding MCLs.

#### 1.4.1.1 Planning Team Members

- USEPA Project Managers:
  - Bill Ryan
  - Ed Moreen
- USEPA Regional Sample Control Coordinator:
  - Jennifer Crawford
- IDEQ Project Managers:
  - Rob Hanson
  - Scott Peterson
  - Bill Hudson
- TerraGraphics Soil Sampling Project Personnel:
  - Derek Forseth – Remediation Project Manager
  - Susan Spalinger – Sampling Project Manager
  - Tarita Harju – On-Site Manager
  - Abe Hanna – Site Health and Safety Officer
  - Jason Williams – Project QA Manager, Results and QA/QC Task Manager, CLP Coordinator
  - Bill Schlosser – GIS Task Manager
  - John Doroshenk – Database Task Manager

- TerraGraphics Dust Sampling Project Personnel:
  - Sarah Weppner – Project Manager
  - Jason Williams – Sampling Task Manager/CLP Coordinator
  - Tarita Harju – Project QA Manager

Technical issues will be reviewed by TerraGraphics staff. Based on the technical review, the TerraGraphics project managers will make recommendations to IDEQ project managers, who will consult with USEPA personnel prior to making a final decision.

#### 1.4.1.2 Description of the Environmental Problem

Sampling efforts will take place in the Coeur d'Alene Basin mining district, which was a major producer of silver, lead, zinc, and other metals beginning in the late 1880s. Historic mining practices have resulted in widespread contamination that threatens both human health and the environment. In particular, many properties contain soils with lead or arsenic concentrations above risk-based corrective action levels, which may become entrained in house dust and expose occupants. Shallow drinking water supplies in several areas of the Basin have also become contaminated with heavy metals above MCLs. In many cases, citizens using private water supplies are unaware of potential health issues.

#### 1.4.1.3 Resources and Relevant Deadlines

This project is funded through the USEPA Superfund Program established by Congress in 1980 to locate, investigate, and clean up the worst environmentally contaminated sites nationwide. Soil sampling will occur during the spring, summer, and fall of 2011. Participant result letters will be delivered throughout the year, with a data summary report being completed by the second quarter of 2012. Sample results will be made available to IDEQ for use in the yard remediation program as soon as data validation and QA/QC processes are complete. Sample maps and results will also be provided to PHD for the Institutional Control Program (ICP). House dust sampling will occur in summer/fall of 2011. Results will be made available to PHD to be used for human health exposure issues as soon as data validation and QA/QC processes are complete.

### *1.4.2 Identify the Decision*

Samples will be collected at the properties of residents who agree to participate in the sampling efforts. Residents will be provided the opportunity to participate through various routes of contact, including phone calls, property visits, and/or letters. Those participating in the annual blood lead screening will also be notified of their opportunity to participate in the sampling program.

Under the soil, dust, and water sampling effort, composite soil or gravel samples will be collected from specific depth intervals (0-1 inch, 1-6 inch, 6-12 inch, 12-18 inch) from different areas including yards, driveways, ROWs, gardens, play areas, flowerbeds, parking areas, dirt garage floors, etc. Composite samples will be collected from an additional depth interval (18-24 inch) in vegetable gardens. Soil samples will be analyzed for lead and arsenic. Concentrations will be compared to the action levels established in the OU3 ROD (USEPA 2002a) and contained in Appendix A. If the concentrations for soils are above the action levels, steps will be taken to remove the contaminated soil and replace it or improve the barrier between residents and the soil. Dust samples will be collected from the vacuum cleaner bags of participating residents, when available, and will be analyzed for lead and arsenic. Results will be used to inform homeowners of any potential health exposure situation and will be used to assess the effectiveness of remedial actions. Drinking water samples will be collected from homes with private water supplies. Drinking water data will be compared to lead, arsenic, and cadmium MCLs to identify the potential need for homeowners to utilize a different source of water. An alternative drinking water source will be provided by IDEQ if levels exceed one or more of the MCLs specified in the ROD.

In the separate house dust sampling effort, dust samples will be collected using dust mats as well as from personal vacuum cleaners when available. Dust sample results from both the vacuum and dust mat sampling will be used to inform homeowners of any potential health exposure situation and will be used to assess the effectiveness of remedial actions.

### *1.4.3 Identify the Inputs to the Decision*

#### 1.4.3.1 Information Needed

In order to determine the threat to human health and potential need for cleanup, lead and arsenic concentrations in soils and dust must be known. Private water supplies must be located and tested for lead, arsenic, and cadmium. High risk homes also need to be identified and prioritized for sampling and remediation.

#### 1.4.3.2 Sources for Information

Soil, dust, and water samples will be collected to determine lead and arsenic concentrations. Information will be collected, compiled in the Coeur d'Alene Basin ICP database system, and used by IDEQ to identify properties that require remediation or properties that are eligible for sampling.

#### 1.4.3.3 Action Levels

Soil concentrations will be compared to established action levels (1,000 mg/kg and 700 mg/kg for lead and 100 mg/kg for arsenic) as described in Section 12 of the *ROD* and the *Residential, Commercial and Rights-of-Way Property Remedial Design Report* (RDR) to determine the need for remediation dependent on depth (USEPA 2002a, IDEQ 2010). Resampling will occur in the 0-1, 1-6, and 6-12 inch depth intervals if the lead and/or arsenic concentrations fall within established levels (i.e., 900 to 999 mg/kg and 60 to 99 mg/kg, respectively). Soil removal for vegetable gardens occurs when lead concentrations are greater than or equal to 700 mg/kg, so this resampling criteria does not apply to garden samples. As a result, if soil concentrations for a vegetable garden are less than 700 mg/kg lead but between 60-99 mg/kg arsenic, soils will be resampled to the 24 inch level for arsenic only. Summary tables for remedial and resample actions are provided in Appendix A.

Drinking water sample results will be compared to the following MCLs for cadmium, arsenic, and lead: 0.005 mg/L, 0.01mg/L, and 0.015 mg/L, respectively (USEPA 2010c).

Residents who contact or are contacted by PHD regarding dust concentrations will be counseled on methods to reduce lead and arsenic exposures.

#### 1.4.3.4 Sampling and Analysis Methods

The soil sampling methodology described in this SAP/QAPP was derived from the methods employed in the Bunker Hill OU1. The Sampling Plan in Section 2.0 provides a detailed description of sampling protocols. Water sample collection will follow the standard collection method for residential drinking water sampling.

All sample handling procedures will follow the guidelines for handling and shipment discussed in Section 2.1.14. SVL will analyze water samples and dry and sieve all soil and dust samples (sieved only, not dried) to the -80 mesh. CLP and SVL will analyze the soil and dust samples. Some samples require quick turnaround analysis; these include samples collected from high risk properties, properties targeted for remediation, properties that would alleviate access issues for the remediation of neighboring properties, and resamples. In 2011, an estimated 1,500 to 1,800 samples will be sent to CLP for 6-day turnaround, and 450 to 550 soil samples will be analyzed at SVL on 2, 5, or 10-day turnaround times. All other soil and dust samples (including the estimated 675 dust samples collected through the house dust sampling effort) will not require quick turnaround analysis and will be sent to CLP on 21-day turnaround.

Soil samples will be analyzed for lead and arsenic using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) according to the Inorganic Analytical Service Statement of Work (SOW) for Superfund (ISM01.2) (USEPA 2010a). Action levels for the site are relatively high, eliminating the need for extremely low detection limits. USEPA has determined adequate Contract Required Quantitation Limits (CRQL) for this method are: 50 mg/kg for lead and 10 mg/kg for arsenic (Spalinger and Hall 2004).

### *1.4.4 Define the Boundaries of the Study*

#### 1.4.4.1 Target Population

The target populations for these sampling efforts are soil, drinking water, and dust located predominately within the Coeur d'Alene Basin (OU3) ICP Administrative Boundary (Figure 1). Appendix B discusses the conditions for sampling outside the ICP Administrative Boundary. In addition, other factors that have and will be considered when determining sample collection activities outside the ICP Administrative Boundary include: i) historical or current mining, milling, or smelter practices and influences on the area; ii) existence of high risk situations, day cares, or cases of elevated blood lead; iii) adjacent sample results indicating required remedial action, especially for gravel areas; and iv) areas with historical practices associated with the transport of materials containing contaminants of concern.

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Homes with young children (6 years of age and younger) and/or pregnant women are of particular interest for both soil and house dust sampling efforts. These homes will be priorities and will be sampled as soon as possible after they are identified; contacted by IDEQ, PHD, or TerraGraphics; and have consented to sampling.

#### 1.4.4.2 Spatial Boundaries

The Coeur d'Alene River Basin extends from the Idaho-Montana border to the Idaho-Washington border. It covers over 3,700 square miles in Shoshone and Kootenai counties in northern Idaho, and generally refers to the area within 1.5 miles of the floodplain. The upper Basin is contained in a steep mountain canyon of the South Fork of the Coeur d'Alene River and adjacent tributary gulches, excluding residential areas within the Bunker Hill Box. The lower Basin, where a majority of the 2011 sampling will be concentrated, is predominately rural.

### *1.4.5 Time Frame*

Soil sampling is projected to take place from early April through October 2011, as weather permits. Figure 4a illustrates a detailed project timeline for the soil sampling effort. House dust sampling is projected to take place from late July through early December 2011. Figure 4b illustrates the project timeline for the targeted house dust sampling effort. There is a six month holding time limitation for soil and dust samples to be analyzed for metals.

#### 1.4.5.1 Constraints

Possible constraints for sample collection are residents' refusal to participate, unavailable residents and homeowners (even with multiple contact attempts), or inclement weather. Practical constraints on data collection for soil sampling include sample refusals caused by excessive vegetation, tree roots, hard rock areas, and other sampling obstacles. If obstacles are encountered, a new subsample location will be chosen.

#### 1.4.5.2 Subpopulations

Each city (Wallace, Mullan, Osburn, etc.) and outlying area sampled in the Basin will be treated as a subpopulation as defined in the HHRA when summarizing data (TerraGraphics and URS 2001).

### *1.4.6 Develop a Decision Rule*

#### 1.4.6.1 Decision Parameters

Soil sampling locations (driveway, yard, flowerbed, etc.) and drinking water samples from each property will be evaluated individually and compared to the action levels.

#### 1.4.6.2 Action Levels

Soil concentrations will be compared to established action levels (1,000 mg/kg and 700 mg/kg for lead and 100 mg/kg for arsenic), as described in the RDR and Section 12 of the ROD, to determine the need for remediation (USEPA 2002a, IDEQ 2010). These levels are also discussed in Section 1.4.3.3 of this document. Resampling of areas will occur when soil lead concentrations are between 900 mg/kg and 999 mg/kg or arsenic concentrations are between 60 mg/kg and 99 mg/kg in the 0-1, 1-6, or 6-12 inch levels. Because soil removal for vegetable gardens occurs when concentrations are greater than or equal to 700 mg/kg, gardens will only be resampled for arsenic to the 24 inch level. Summary tables for remedial and resample actions are provided in Appendix A. Concentrations of metals in drinking water samples will be compared to MCLs stated in the OU3 ROD (USEPA 2002a).

#### 1.4.6.3 Decision Rule

Soil with a lead concentration greater than or equal to 1,000 mg/kg or an arsenic concentration greater than or equal 100 mg/kg will be removed to the appropriate depth and replaced with clean soil. Clean replacement soil contains less than 100 mg/kg lead and less than 35 mg/kg arsenic. If the lead concentration is greater than or equal to 700 mg/kg but is less than 1,000 mg/kg, barrier enhancement (e.g., sod, stepping stones, gravel) will be carried out. Remediation criteria tables are provided in Appendix A and discussed in the RDR (IDEQ 2010).

### *1.4.7 Specify Tolerable Limits on Decision Errors*

The purpose of this step is to specify the decision maker's tolerable limits on decision errors. In general, data are subject to random and systematic errors throughout the collection process (e.g., from field collection to sample analysis). These errors are introduced in the measurement process during physical sample collection, sample handling, sample preparation, sample analysis, data reduction, transmission, and storage and can produce the potential for two types of decision errors. The two types of decision errors that are of importance include i) Type I errors, in which a sampling unit may be identified as requiring removal when, in fact, it does not exceed the Remedial Goal (false positive conclusion) and ii) Type II errors, in which a sampling unit is not identified as requiring removal, when it does exceed the Remedial Goal (false negative conclusion).

In evaluating these data for use, both potential types of errors are considered. A Type I error would result in cleaning up a portion a property that, in fact, did not exceed the Remedial Goal. The damage with a Type I error is waste of public monies, although some property improvements would likely be realized. A Type II error would fail to identify a sampling unit that requires removal. The potential damage associated with a Type II error could be the exposure of pregnant or nursing women or children to an identified health risk. In consideration of these potential outcomes, this evaluation assumes that Type II errors should be avoided and potential Type I errors be considered on a cost-effective basis, balancing sampling expense against remediation costs.

Soil lead concentrations between 900 mg/kg and 999 mg/kg in the 0-1, 1-6, or 6-12 inch depth intervals will be resampled at different sampling locations in the same area, following the same soil sampling protocol, to help ensure removal is not required and to reduce Type II errors. If an arsenic concentration is the trigger for remediation, resampling will occur if the concentration is between 60 mg/kg and 99 mg/kg. Decisions will be based on sample data that have passed the QA/QC process.

### *1.4.8 Optimize the Design*

A statistical sampling design will be used to collect soil samples for lead and arsenic. A stratified grid sampling design and composite samples will achieve the DQOs described above. A stratified grid sampling design allows for sampling units to be selected based on potential exposure areas and differing soil characteristics. Composite samples from the sampling units will provide an average concentration of an exposure area that may require a response action (e.g., removal). Additionally, composite samples reduce analytical costs and may provide a better estimate of the mean by providing more coverage (better representation) of the exposure area. By identifying the sampling unit, or exposure area, and sampling homogeneous media, the potential for Type I and Type II decision errors may be mitigated.

## 1.5 Special Training Requirements/Certifications

Individuals collecting samples will have completed a minimum of an Occupational Safety and Health Administration (OSHA) 24-hour Hazardous Materials Technician course and have current certification, in compliance with OSHA regulation 29 CFR 1910.120. Crew members will undergo extensive training for sample collection, handling, and documentation requirements. Laboratories performing the analyses will be part of the USEPA's CLP or be certified in the State of Idaho for performing soil and drinking water analyses.

## 1.6 Documentation and Records

### *1.6.1 Field Operation Records*

#### 1.6.1.1 Sample Collection Records

Samplers will provide property occupants or owners a receipt for collected samples. An example of this form is provided in Appendix C. A separate logbook entry and sample map of the property will be completed for each residence and will, at a minimum, include the following:

- Address and parcel number
- Sampler name(s)
- Date and time
- Drawing of the site (for soil sampling) with:
    - Sample hole locations to the nearest one-foot
    - Sub-areas (i.e., ROW, Garden, etc.)
    - Building locations
    - Trees and other landmarks
    - North arrow justification

As sample collection records are brought in from the field, the Crew Coordinator, proofers, and Site Manager will review them for accuracy. Field operation notes and related records will be labeled

and cataloged as part of the Coeur d'Alene Basin Project permanent file. The contents of this file will be made available to EPA, IDEQ, or PHD upon request. Original hardcopies will be archived for a minimum of seven years following the termination of the TerraGraphics and IDEQ contract, when they will be transferred to IDEQ.

#### 1.6.1.2 Chain-of-Custody Records

The chain-of-custody (COC) record for samples shipped to CLP will follow the formatting provided by the USEPA-CLP guidance (Appendix C). COC records for SVL will follow the standard TerraGraphics COC record format (Appendix C).

#### 1.6.1.3 QA/QC Sample Records

Field QA/QC samples (i.e., field duplicates, splits, equipment rinsate blanks, and field blanks) will be documented in the logbook, on sample identification tags, and in the electronic masterlog.

#### 1.6.1.4 Refusal Records

Soil sampling refusals by property owners or residents will be documented on a Participant Information Form (Appendix C). Pertinent information will be tracked explaining why a potential participant refused and whether the resident was a renter or owner. Copies of refusals will be given to IDEQ and PHD as soon as possible following receipt of information.

#### 1.6.1.5 General Field Procedures

Field procedures for sample collection are outlined in Section 2.0. If a deviation from these procedures occurs, it will be approved by the Project Manager. Documentation in field logbooks will include the actual method of collection, location, and other potential areas of difficulty during sample collection.

#### 1.6.1.6 Corrective Action Reports

Should the primary method of sample collection fail, the corrective action or alternative method will be documented in the field logbook and reported in the subsequent reports. For instance, should the ground be too rocky or dry for slam bars, a pit may be dug with shovels. This corrective action will be noted in the field logbook.

TerraGraphics will complete internal QA/QC of the data to ensure the quality of the data has been established before use or dissemination. Summary memos will be included in the Data Summary Report. Any additional data qualifiers or corrective actions determined to be necessary through this data verification and validation review will be included in the permanent record in the database. Data verification and validation will follow USEPA guidance (USEPA 2002b, 2010b).

### *1.6.2 Laboratory Records*

#### 1.6.2.1 Sample Data

The CLP laboratories will follow the appropriate CLP guidance for inorganic analysis, which includes recording the date samples were analyzed to verify holding times were met. The overall number of samples, sample identification information, and date will be reported as well as any corrective action procedures for samples violating the work plan protocol. SVL will follow

established Standard Operating Procedures (SOPs) for sample handling, tracking, screening, and packaging of samples. SVL's SOP is provided in Appendix D.

#### 1.6.2.2 Sample Management Records

The CLP Laboratories will provide original sample analysis documentation to USEPA. After a technical data review, the data will be sent to the USEPA Superfund Records Center where it will be archived according to federal records retention policies. SVL maintains records as required by their contract with IDEQ.

#### 1.6.2.3 Test Methods

The test methods used will be those identified as appropriate for CLP Inorganic Analysis using ICP-AES (USEPA 2010a). Should an alternative analysis be required, the laboratory will document and describe how the analysis was carried out in the laboratory, including the sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria.

#### 1.6.2.4 QA/QC Reports

The laboratory QA/QC will follow USEPA guidelines for CLP inorganic analysis (USEPA 2010a). Examples of laboratory QC samples include blanks, spikes, and duplicates. Documentation will include custody seals, calibration history, level of standards, and the frequency and type of the QA/QC sample. Data Validation Reports will be prepared by USEPA and provide a review of the laboratory processes. Any qualifiers changed in these reports are updated by TerraGraphics in the permanent record in the database.

### *1.6.3 Data Handling Records*

USEPA Region 10 QA personnel will perform the data validation on soil and dust sample results analyzed by CLP. Data received from the CLP laboratories will be processed through the Electronic Data Exchange and Evaluation System (EXES) system to examine QC for analytical results and evaluate them against data review criteria, which are appropriate for the corresponding analytical method/procedure and the intended use for this project. The EXES system uses both Regional and National Functional Guidelines to review and evaluate analytical data.

The USEPA Region 10 Sample Management Office contractor will put the data through the Contract Compliance Screening (CCS) to ensure that the laboratory has complied with CLP SOW terms and conditions included in its contract. After passing through CCS, electronic data deliverables (EDD) will be made available to USEPA regional contacts and TerraGraphics on the EXES data manager website.

SVL results are also received at TerraGraphics via email, followed by hard copies.

# Section 2.0 Sampling Plan/Measuring Data Acquisition

## 2.1 Sampling Process Design

Soil sampling will occur on residential, commercial, unmaintained vacant properties, ROWs, unpaved urban alleyways, and rural city/county dirt roads, as discussed in Section 1.3.1. If a property has been sampled prior to the ROD, but after 1996 (i.e., 1997-2001), a site visit will occur to ensure all locations have been sampled and there are no data gaps for remedial decisions. The site visit will be documented.

Generally, the sampling process is as follows. Prior to sampling, utility companies will be contacted to visit each property to locate their lines. Sample holes will not be placed within two feet of any marked utility line, unless the line is first located by hand-digging. Each area will be measured with a tape measure, and a hand drawn map will be generated from which the square footage will be calculated. One soil subsample will be collected for approximately every 500 square feet of area with a minimum of four subsamples per area, with the exceptions of roads, ROWs, and commercial properties, discussed in Sections 2.1.4, 2.1.6, and 2.1.7. Subsamples will be composited with equal volumes by depth interval into one sample per depth interval. Four different depth intervals will be sampled: 0-1 inch, 1-6 inch, 6-12 inch, and 12-18 inch, with the exception of vegetable gardens and Type II commercial properties (discussed in Section 2.1.2, and 2.1.7). Soil samples will consist of mineral and/or inorganic materials only. Materials such as plant matter, debris, and large rocks will be removed, to a reasonable extent, prior to placing the sample in the sample bag.

If a sample area has homogenized soil or gravel and a physical barrier preventing sample collection below 6 inches (for example a play area with three inches of sand in a wood-bottom box) or the sample area is a homogenized pile of material, an alternative depth will be collected, depending on the depth of the material: 0-2 inch, 0-3 inch, 0-4 inch, 0-5 inch, or 0-6 inch. If there is no permanent barrier between the homogenized material and the underlying soil or the pile is not well defined (appears flattened or spread out) then an alternative depth should not be used and the area should be sampled using standard depths with a comment added noting the depth of the material change.

The minimum number of samples and the number of samples per unit area are based on past negotiations between USEPA, IDEQ, and the Potentially Responsible Parties (PRPs), and are substantially equivalent to that used in the Box (OU1 and OU2) area of the Superfund Site (UMG 1994). The protocol was successfully applied by the PRPs in the Box, was familiar to personnel and residents of the area, and provided consistency across the Box (and Basin in other years). Other Basin sampling protocols that have been approved for residential sampling used a maximum of 20 holes per property, as well as a four-hole composite per sample, for properties up to 1.5 acres in size (URS 1999a, 1999b). The sampling protocol in this SAP generally provides more coverage per property (more than 20 holes), depending on distinguishable discrete areas and size of the property.

Samplers will wear clean latex, nitrile, or polyethylene gloves when working with soil from each interval, for personal protection, and will replace the gloves between samples to prevent cross contamination. All non-disposable sampling equipment will be decontaminated before being used in a different sample area (i.e., between the yard, garden, ROW, etc.), discussed in Section 2.1.11.

Decontaminated equipment will be stored in designated clean containers. Used equipment will be kept separate in another designated container. If there is an indication that material from one level has mixed with another intended sample level, the aliquot will be discarded and a new one collected. If obstructions related to sample location occur in the field, a new sample point will be selected as close as possible to the original location. If there are changes to the original location, they will be documented in the field logbook.

Each sample collected will have a unique identification code that will identify the home from which the sample was collected, the sample area, and depth. The field sample ID number will be coded as follows:

- The first seven characters are the houseID, a unique number assigned prior to sampling (i.e. "10-1234")
- The next two numbers are surrounded by dashes and represent the sampling team number (i.e. "-06-" for team 6)
- The next three characters indicate the sample location and are followed by a dash
    - Yard – YS1, YS2, YS3…
    - Right of Way – RW1, RW2, RW3…
    - Driveway – DW1, DW2, DW3…
    - Flower Garden – FG1, FG2, FG3…
    - Garden – GD1, GD2, GD3…
    - Garage – GG1, GG2, GG3…
    - Other Discrete Area – OS1, OS2, OS3…
    - Play Area – PA1, PA2, PA3…
    - Parking Area – PK1, PK2, PK3…
    - Road – RD1, RD2, RD3…
    - Drinking Water – DR1, DR2
    - Rinsate Blank – RB1
    - Field Blank – FB1
    - Vacuum – VC1
    - Surface Water – SW1, SW2
- The next character indicates the sample depth
    - A – 0-1"
    - B – 1-6"
    - C – 6-12"
    - D – 12-18"
    - E – 18-24"
    - R – 0-2"
    - S – 0-3"
    - T – 0-4"
    - U – 0-5"
    - K – 0-6"
    - Z – no depth (applies to dust and water samples)
- The next four characters indicate a quality control sample ("-SPL" – Split, "-DUP" – Duplicate, "-RSP" – Resample, "-RSS" – Resample Split, "-RSD" – Resample Duplicate)
- Example: 10-1234-06-YS2-A-DUP

Samplers will note any abnormalities in sampling holes on the sample maps, specifically slag or orange material. For instance, the area containing the holes will be circled and a note written, such as, "In these 10 holes, slag was found in the C level." If an alternative depth level is used, a reason

must be included in the logbook or on the sample tag. All sampling forms and paperwork are included in Appendix C.

Soil sampling protocols will follow those described in Sections 2.1.1 through 2.1.11. House dust sampling protocols will follow those described in Sections 2.1.12 and 2.1.13.

### *2.1.1 Sampling Process Design – Soil Areas*

In an effort to offset some remedial expense and reduce variation associated with heterogeneous sample areas, distinguishable discrete areas, such as raised flowerbeds, vegetable gardens, driveways, ROWs, and play areas, may be sampled apart from the yard if those areas consist of different material and could be remediated separately. The presence of fences or walkways will not be used to separate sample areas, except for ROWs, unless other distinguishable characteristics, such as differences in material or elevation, are met as well. When possible, the homeowner will be consulted to determine whether or not the origin of discrete area material is different from that of the soil in the yard.

Large yards, greater than 0.25 acre in size (equivalent to 10,890 sq. ft.), may also be segregated into multiple yard areas based on characteristics that include:

- Variation in current and future site use in the yard;
- Elevation changes greater than one foot;
- Differences in soil material;
- Ability to separate areas of property based on current or reasonable future use (e.g., play areas);
- Ability of yard to be divided into separate remedial action areas;
- Type of vegetation (presence of trees, grass); and
- Geography of site (presence of hills, streams, etc.).

When collecting yard soil samples, samplers will remain at least three feet away from exterior painted surfaces that are in poor condition, as defined by the Department of Housing and Urban Development (HUD). Poor exterior paint condition is defined as paint that is peeling, cracking, flaking, and/or chalking on more than 10 square feet on the exterior wall or more than 10% of the surface (HUD 1995 and updates). Paint condition also will be noted as poor if paint chips are observed on the ground.

If a flowerbed is raised or has different material than the yard, and it is present within three feet of the house, it will be sampled regardless of paint condition. A buffer zone of three feet was selected because most flowerbeds will not be wider than that, and most side yards have areas wider than three feet for sample collection. When surfaces are not painted or have paint in good condition, samples will be collected in all sample locations, regardless of proximity to the drip line. Samples will be collected under tree canopies. Field decisions will be made on a case-by-case basis and documented in the field logbook, as properties differ.

A 2-inch diameter soil probe (slam bar) will be used for soil collection. When sampling with the soil probe, the sampler will drive the soil probe 18 inches into the soil (24 inches for gardens). If the soil probe cannot be driven at least 18 inches deep, the sampler will choose a new location. If the ground is inclined, the soil probe will be used perpendicular to the ground slope.

As an alternative to using the soil probe, the sampler may dig a pit and collect the sample from the sidewalls of the excavation.

Samplers will collect soil from each depth interval into a separate sample container. Materials such as plant matter, debris, and large rocks will be removed, to a reasonable extent, prior to placing the sample in the sample bag. Required equipment includes slam bar, plastic cups, sample buckets, metal stakes, mallet, gloves, and sample bags. Samples will be composited in the field. Samples are collected using the soil probe as follows:

1. Attach first core barrel onto soil probe and drive it to a depth of six inches. Remove core barrel from probe.

2. Remove the grass cap from the soil, making sure all soil is removed from the root wad and being careful not to disturb the 0-1 inch soil depth. Keep the grass plug for replacement. Place the top inch of soil into the sample bucket designated for the A level sample. Place the 1-6 inch soil depth into the clean sample bucket designated for the B level sample.

3. Clean the end of the soil probe with a wipe to remove any soil remaining from the previous depth. Screw the second core barrel onto the soil probe. Drive it 12 inches into the ground. Remove soil from the core and place it into the clean sample bucket designated for the C level sample. Keep the second core barrel in the same bucket.

4. Clean the end of the soil probe with a wipe to remove any soil remaining from the previous depth. Screw the third core barrel onto the soil probe. Drive it 18 inches into the ground. Remove soil from the core and place it into the clean sample bucket designated for the D level sample. Keep the third core barrel in the same bucket.

5. Repeat the process using the same core barrels for other subsamples in the same designated sampling area.

6. Composite soil samples from the same intervals into corresponding Whirl-pak® sample bags. Thoroughly mix the soil in each bucket, using a clean pair of gloves for each bucket. If samples are collected from 10 holes or less, two level scoops per hole should be taken from the manually homogenized soil in the bucket (i.e. for an area with eight holes, 16 scoops will be taken from the bucket labeled “A,” and will be placed in the sample bag for “A.”) If samples are collected from more than 10 holes, only one level scoop per hole will be taken from the homogenized bucket. If an area is large enough that the soil fills more than half of the bucket, the half-full bucket will be mixed, and the appropriate number of scoops will be collected from it (based on the number of holes). Another bucket will be used to collect the remaining subsamples from the area, that bucket will be mixed, and the appropriate number of scoops per hole will be added to the sample bag. This will be done to ensure adequate mixing.

7. Complete sample tag (Appendix C) and attach to corresponding sample bag.

8. Mix the soil from all the buckets and fill the holes with the remaining soil. Add 1-2" of uncontaminated soil to the holes, or enough so they are filled completely. Tamp holes to compact them. Replace grass caps.

### *2.1.2 Sampling Process Design – Garden Areas*

Flower gardens that are level with the yard and appear to have the same material will be sampled with the yard. One hole will be placed in each of these flower gardens, to be composited with the yard samples, providing that house paint surfaces are in "good" condition and the garden is within three feet of the house, as outlined in Section 2.1.1. Raised flowerbeds and flowerbeds that have different soil material will be sampled separately from the yard, following the protocol described in Section 2.1.1. The depth and description of any cap material, such as river rock or mulch, will be noted in samplers' logbooks and on sample tags. Cap material will be sampled if fine materials are present. Otherwise, the cap material will be moved aside, and sampling of the "A" level will occur at the top of the soil.

Gardens that are level with the yard, contain the same material as the yard, and only have tall berry patches, such as raspberries, will be sampled with the yard. Strawberry patches and other low-level berry patches will be sampled as vegetable gardens.

Vegetable gardens will be sampled using the same protocol as described in Section 2.1.1. However, samples will be collected from the 0-1 inch, 1-6 inch, 6-12 inch, 12-18 inch, and 18-24 inch depth intervals.

### *2.1.3 Sampling Process Design – Gravel Areas*

Gravel areas such as driveways and parking areas will be sampled with the following protocol. Small sample pits will be excavated by bar/shovel to a total depth of 18 inches, prior to beginning sample collection. Required equipment includes shovel, steel bar, stake, plastic cup, gloves, and plastic sample bags. If the area requires ten holes or less, two level scoops of material will be collected from each depth interval in each hole. If more than ten holes are required, one level scoop from each depth interval in each hole will be collected. A clean sample wall will be prepared in the pit prior to sample collection.

1. Wearing a clean pair of latex, nitrile, or polyethylene gloves, use a decontaminated sampling tool to scrape the wall of the pit and expose a fresh surface for sampling.

2. Wearing a clean pair of latex, nitrile, or polyethylene gloves, sample the 12-18 inch interval with a decontaminated sampling tool by digging in at the 18 inch level and removing material evenly to the 12 inch level from all around the pit. Place the material in the sample bag labeled "D."

3. Wearing a clean pair of latex, nitrile, or polyethylene gloves, sample the 6-12 inch interval with a decontaminated sampling tool by digging in at the 12 inch level and removing material evenly to the 6 inch level from all around the pit. Place the material in the sample bag labeled "C."

4. Wearing a clean pair of latex, nitrile, or polyethylene gloves, sample the 1-6 inch interval with a decontaminated sampling tool by digging in at the six inch level and removing material evenly to the one inch level from all around the pit. Place the material in the sample bag labeled "B."

5. Wearing a clean pair of latex, nitrile, or polyethylene gloves, sample the 0-1 inch interval with a decontaminated sampling tool by removing material evenly from the one inch level to the surface from all around the pit. Place the material in the sample bag labeled "A."

6. Repeat the previous four steps at each test pit location and add equal amounts of sample from each test pit to the various depth interval bags.

7. Backfill the sample pits with the excavated material from the sample pit and clean dirt/gravel if necessary. Thoroughly tamp the pits to compact the soil/gravel.

Soil samples will be homogenized through the drying and screening process as described in Appendix D and 2.1.15.

### *2.1.4 Sampling Process Design – Rights-of-Way*

ROWs are generally defined as gravel road shoulders; however, they may include grass or other material. A property and the neighboring properties should be observed for the presence of fences, telephone poles, power boxes, gravel or other indicators, in order to identify ROW boundaries. Areas between sidewalks and streets will be sampled as ROWs. If a ROW boundary has been determined using surrounding indicators and has both gravel and grass sections, only the gravel area closest to the road will be sampled. If there are no obvious ROW boundaries, the ROW should be assumed to be 4 feet wide.

Ditches will not be sampled as separate areas or with ROWs unless requested for unique circumstances (such as evidence of children playing in the ditch). Ditches are typically adjacent to a road or near a ROW. If ditches are present in the ROW, only the flat part of the ROW will be sampled.

In urban residential areas, one soil sample will be collected from each depth interval for approximately every 500 square feet of ROW, with a minimum of two subsamples.

Outside urban residential areas, a ROW length (instead of square footage) will be used to determine sampling frequency. For ROWs that are 1,000 feet long or less, four evenly spaced subsamples will be collected and composited by depth interval. For ROWs between 1,500 and 2,000 feet in length, the ROW will be divided into two equal length sections and four evenly spaced subsamples will be collected and composited by depth interval. For ROWs greater than 2,000 feet in length, the ROW will be divided into 1,000-foot sections until a final section is reached which is less than 1,500 feet in length. Sample collection will follow the protocol discussed in Section 2.1.3.

### *2.1.5 Sampling Process Design – Other Discrete Areas*

Other discrete areas are any areas that are not definable within the sample locations described above (i.e., driveway, yard, garden, ROW, play area, parking area, flowerbed, etc). Other discrete areas that are regularly used will be sampled according to protocols discussed above. Other areas that are larger than 4,000 square feet will be sampled with the protocol for Type I commercial properties, described in Section 2.1.7, and noted on the sample map. Unmaintained or unused areas will not be sampled unless evidence of child use is apparent. For instance, if there is a large field located a distance from the house with a path leading to a picnic area, the path and picnic area would be sampled, but the field would not be sampled. IDEQ will be consulted when specific areas are in question.

If the other discrete area is a soil or gravel pile, samples will be collected using an alternative depth, as described in Section 2.1, and composited. A comment indicating the type of material will be included on the sample map or tag.

### *2.1.6 Sampling Process Design – Dirt Road and Unpaved Alleyway*

The appropriate city or county staff will be consulted when city or county dirt roads and alleyways require sampling. Roads and alleys will be sampled and tracked separately from residential and commercial properties. However, if properties within a city block are being sampled, the nearby alleyway will also be sampled (but separate from the properties) around the same time frame. Roads and alleys will be sampled according to the ROW procedures for outside urban residential areas as described in Section 2.1.4. The area to be sampled will be determined by linear feet in place of square footage using this protocol to allow for a continuous strip of road or alley to be sampled as one area, instead of being broken up and sampled separately. A Global Positioning System (GPS) unit will be used to record a waypoint at both ends of a 1,000-foot section (or both ends of the road if less than 1,000 feet). A waypoint will identify road locations on a map. The samplers will record waypoints in their logbooks. Concurrent with using the GPS unit, samplers will make a map with sample locations (in feet), waypoints, landmarks, road names, etc. In the event the GPS cannot receive enough satellite signals to determine location, a map with sample locations will be used to identify the location of the road and the sample points.

Due to possible vehicle traffic, samplers will wear orange vests and display orange cones and signs for safety. Cones and signs will be placed in highly visible locations where drivers can clearly see them. Cones will also be placed around sampling holes to help drivers avoid them.

### *2.1.7 Sampling Process Design – Commercial Property*

Commercial property soil sample collection will consist of sample collection for two categories of properties.

- Type I commercial properties are those predominately used by the sensitive population (children 0 to six years of age and pregnant females) and/or those with unrestricted access from an adjacent residential property.
- Type II commercial properties are those that are not predominately used by the sensitive population and/or those with restricted access from adjacent residential properties.

Type I commercial properties will have samples collected to a total depth of 18 inches. Samples will be collected from four depth levels: 0-1 inch, 1-6 inch, 6-12 inch, and 12-18 inch depth intervals. Type II commercial properties will have samples collected to a total depth of 12 inches. Samples will be collected from 0-1 inch, 1-6 inch, and 6-12 inch depth intervals. Each depth interval sample will be analyzed for lead and arsenic. The 6-12 inch sample results for Type II properties and the 12-18 inch sample for Type I properties will be obtained for ICP documentation and, in the case of the Type I properties, to determine the need for barrier placement.

For commercial properties with open areas up to 4,000 square feet in size, one subsample location per 500 square feet will be composited, with a minimum of two and a maximum of eight subsample locations. Subsamples collected for each composite will consist of material within appropriate matching depths. For commercial properties with open areas larger than 4,000 square feet, there will be one composite of eight subsamples per 0.5 acre (21,780 square feet). Areas larger than 0.5 acre will be split into equal areas and sampled separately with eight subsample locations in each area. For instance, a 1.75 acre area will be sampled as four equal areas. Each of the areas will have eight subsample locations composited by each depth interval for a total of four samples for Type 1 properties and three samples for Type II properties (UMG 1994).

### *2.1.8 Sampling Process Design – Large Properties*

Properties with more than 2 acres of sampling areas will be sampled based on the guidelines outlined in the memo entitled "*Sampling decision tree and large property sampling approach - Rev 5, Final"* (see Appendix B). These properties will be sampled according to the residential property sampling protocols described in Sections 2.1.1 through 2.1.5. IDEQ will accompany sampling crews on properties where it is unclear whether "other areas," as outlined in Section 2.1.5, should be sampled. Training on selected large properties will occur at least on an annual basis. IDEQ will update USEPA on large sampling issues.

### *2.1.9 Sampling Process Design – Vacant Lots*

A vacant lot will be sampled based on the guidelines outlined in the memo entitled "*Sampling decision tree and large property sampling approach – Rev 5, Final*" (see Appendix B). Vacant lots with no distinguishable sampling areas (unmaintained) will be sampled according to Type I commercial property sampling protocol as described in Section 2.1.7. Typically, ROWs and the open area of the lot will be the only sampled locations. Lots with vacant homes that have maintained yards will be sampled according to the residential property sampling protocol described in Sections 2.1.1 through 2.1.5.

### *2.1.10 Drinking Water Samples*

Water samples will be taken if a home has a private well used for drinking water. Samples will not be taken from wells that are currently not in use based on information from property owners. Whenever possible, two water samples will be taken at the water source: an 'initial' sample and a 'purged' sample. An 'initial' sample will be collected from a source such as the kitchen or bathroom tap that has not been used for at least six hours. Subsequently, a 'purged' sample will be collected either after a 10-minute flushing period of the same water source or at the well head prior to any holding tanks or filters. Water samples collected by sample crews will be collected into one-liter polyethylene bottles pre-filled with 5 mL of nitric acid for lead, cadmium, and arsenic analysis using ICP-AES. If all suitable household water sources have been used in the six hours prior to samplers

arriving at a home, water sample bottles and sampling instructions will be left with the resident (see Appendix C). To avoid any potential problems with residents accidentally overfilling the bottles, those bottles left for the resident to collect the samples are not pre-preserved with nitric acid. When water bottles are retrieved from residents, samplers add the nitric acid. Water samples will be stored in a cooler in the field to prevent overheating and will then be stored in a secure refrigerator at the TerraGraphics office prior to submittal for laboratory analysis.

### *2.1.11 Decontamination Procedures*

The following describes the general decontamination procedures for field equipment. Non-disposable equipment will be decontaminated between sampling each sample collection area (driveway, yard, garden, etc.) to avoid cross contamination between samples. The nipple used to hold the core/sample bit in place will also be cleaned with a wipe between soil horizons during sampling to avoid cross contamination between soil sample horizons. After each area is sampled, the nipple will also be thoroughly decontaminated using the methods below.

Field personnel will wear disposable gloves while decontaminating equipment at the project site. Personnel will be required to take precautions to prevent contaminating themselves with the wash water and rinse water used in the decontamination process. The following procedures will be implemented, to ensure that sampling equipment is thoroughly decontaminated:

1. Visually inspect sampling equipment for soil; a stiff brush will be used to remove any visible material.

2. Wash the field equipment with phosphate-free soap (Liquinox™ or equivalent) and water, rinse with distilled water, then air dry or wipe with disposable paper towels.

3. Disposable items such as paper towels, disposable gloves, and washcloths will be deposited into a garbage bag and disposed of in a solid waste landfill. Wash and rinse water will be disposed of down the drain at the end of each day and will end up at the municipal sewer.

Field personnel will remove and store coveralls and footwear in a designated area at the end of the day to prevent personnel from contaminating their homes. Coveralls will be washed as needed. The room where the protective equipment is donned and doffed will also be cleaned as needed.

### *2.1.12 Vacuum Dust Collection Protocol*

Vacuum dust samples will be collected from household vacuum cleaners during the house dust survey and at the time of soil sampling, if available. The sampler will confirm that the vacuum has not been used outside the home; if it has, then no vacuum sample will be collected.

1. Remove the vacuum cleaner from the house and take it outside to prevent the spread of dust inside the home when the sample is collected.

2. Wear clean latex or nitrile gloves while handling the vacuum cleaner and collecting the sample. Use a new pair of gloves for each sample.

3. If the vacuum cleaner has a bag, remove the vacuum cleaner bag from the vacuum. If there is only a small amount of dust present, place the entire contents of the bag into a large resealable plastic storage bag. If there is more than a small amount of dust in the bag, place your gloved hand over the hole in the vacuum bag while gently shaking so the fine dust settles to the bottom of the bag. Slice or rip open the vacuum bag. Remove any large objects or hairballs. Scoop out all of the fine dust and place it into a reclosable plastic storage bag. Close the vacuum bag as much as possible to contain the remaining dust and dispose of it in the resident's outside trash can.

4. If the vacuum is a bagless vacuum, carefully remove the canister to avoid loss of material. If there is only a small amount of dust present, place the entire contents of the canister into a large resealable plastic storage bag. If there is more than a small amount of dust in the canister, remove any large objects or hairballs. Scoop out all of the fine dust and place into a reclosable plastic storage bag.

5. If the resident has provided a vacuum bag sample, offer to install a new bag if the resident has one available. Reassemble the vacuum cleaner and return it to the resident.

6. Fill out all sample bags, tags, the site description form, and the field logbook as the sample is collected. Attach the sample tag to the sample at the time of collection.

7. Record relevant information in the field logbook and on the site description form.

### *2.1.13 Floor Mat Protocol*

A carpeted floor mat for dust collection will be placed at all homes that participate in the targeted summer house dust survey in an attempt to quantify lead and arsenic concentration, and dust and lead or arsenic loading rates. Except for unusual circumstances, floor mats will be placed just inside the main entry of houses in the Basin. Instructions will be left with the resident not to vacuum, shake, or move the mat. After approximately three to four weeks, the mat will be retrieved and carefully placed and stored fiber side up in a clean, sealed envelope. The mat will be vacuumed in a special laboratory at the TerraGraphics Kellogg office to collect the dust retained on the mat. The dust samples will be sent to SVL for sieving and then to CLP for lead and arsenic analysis. The mass of dust collected is used to determine the dust and lead or arsenic loading rates ($mg/m^2/day$). The following sampling procedures will be used.

#### 2.1.13.1 Floor Mat Placement Procedures

1. Label the Tri-Rib® indoor/outdoor multi-use mat manufactured by Royal Floor Mats with the house identification number on a piece of duct tape on the back of the mat and place in a high traffic area, inside the house and as close to the main entry as possible.

2. Complete a site description form to identify the sample, and make a sketch showing the dust mat location in relation to the rest of the residence. The sketch will also show the position of the house relative to nearby streets and the addresses of homes on each side. The site description form should include the street and mailing addresses, house identification number, sampler initials, the placement date, and whether a dust sample was taken from the household vacuum.

3. Fill out a sample tag for each mat as it is placed. The information on the tag should include the house identification number and site address. Record comments relevant to the sample in the comments section at this time. Staple the tag to the site description form. The remainder of the tag will be completed when the mat is vacuumed.

4. Explain and provide a mat instruction sheet to the resident when the mat is placed (also included in Appendix C).

5. Place the site description form and sample tag in the mat collection file.

#### 2.1.13.2 Floor Mat Collection Procedures

The mat will be collected from the residence approximately three to four weeks (21-30 days) after placement. To provide consistency in dust mat collection and to ensure the mats are handled such that the sample volume is not compromised, a dust mat questionnaire will be completed (see Appendix C) and the following procedure will be adhered to:

1. Confirm sample numbers, the house address, and the resident's name prior to retrieval.

2. Using an indelible ink marker, label the outside of a collection envelope with the sample number. The mat will be handled and stored with the mat fiber side facing up.

3. Write the retrieval date on the site description form and on the sample tag. Attach the sample tag to the mat.

4. Put on clean latex gloves before placing the collection envelope on the floor at one end of the mat.

5. Slide the mat into the open end of the envelope, being careful not to disturb or shake dust from the mat.

6. Tape the collection envelope shut, making sure that all seams are sealed to prevent dust from getting into or out of the envelope.

7. Place the envelope into the cardboard collection box. The mat will be handled such that the fiber side remains up and that no material is disturbed or lost. Write the sample number on the box. Repeat this step for each mat collected until the box is full.

8. Strict COC of all samples will be maintained at all times. Each box will be sealed with an appropriate custody seal prior to transporting the mats to the sample processing area. All boxes must be labeled "This Side Up" to ensure the dust mats remain fiber side up.

9. All storage containers will be transported by project personnel to ensure that the containers remain level and mats are fiber side up.

#### 2.1.13.3 Floor Mat Sample Extraction Protocol

All floor mats are delivered to the TerraGraphics Kellogg office where a special dust vacuuming room is maintained for mat processing.

1. Mats will be kept flat, fiber side up, and sealed in boxes at all times prior to sample processing.

2. All mats will be brought to a designated storage area for processing.
3. Prior to mat processing, the processing room shall be inspected for proper operation:
    - Interior surfaces (floors, shelves, vacuuming surface) are to be clean and free of dust (clean if necessary).
    - Door fittings and seals are functional; exterior walls are sealed with no holes or openings (repair if necessary).
    - Sampling and vacuum apparatus assembly areas are clear and free of obstructions.
    - Tacks and fittings are available and in working condition.
4. Prior to mat processing, the condition of health and safety equipment will be inventoried and checked. This includes:
    - On the first day of mat processing, personal air monitors will be used to assess airborne concentrations of lead. Respirators will be used during mat processing only if required by OSHA standards.
    - Gloves.
    - Fire extinguisher.
    - Emergency power switch.
    - Notifying supervisor or appropriate lab personnel of activities and schedule.
5. Prior to mat processing, the condition of all sampling equipment and supplies will be inventoried and checked, including:
    - Appropriate log and sample description forms and clipboards.
    - Utility knife for cutting boxes, envelopes, and tape.
    - Clean and operational scales.
    - The 12.0 amp Eureka The Boss™ vacuum cleaner (sample collector) is clean and operational, including:
        - Main body of machine.
        - Sample bag attachment area.
        - Hoses and fittings.
        - Nozzle.
    - Adequate supply of micro-filtration vacuum bags in manufacturer's packaging.
    - Tape and fitting materials.
    - Reclosable plastic storage bags.

- Disposable wipes.
- KimWipes™.
- Paper towels.

6. Equipment will be placed in the appropriate locations in the processing area.
7. Put on required safety equipment:
    - Wear a respirator (if required) and gloves. A new pair of gloves will be worn for each mat sampled.
    - Enter the processing area; minimize exits and entries.
8. Mat Preparation Procedure:
    - Open the box along one end with razor edge.
    - Remove each mat individually, always keeping the mat flat with the fiber side up; check sample numbers against the mat sampling log and box label; note any discrepancies in box and sample numbers.
    - Note any broken seals or dirt in boxes. If seals have broken and there is dirt or dust in a box, return all mats to the box and set the box aside for supervisory inspection; proceed to the next box.
    - Set the box in a location appropriate for receiving cleaned mats after vacuuming.
    - Maintaining a flat and fiber-side-up position, place the mat (still in an envelope) on the vacuuming table; use a utility knife to slice open the envelope along the facing edge and two sides; fold the top of the envelope over 180° so it lays flat on the table with the inside surface facing up.
    - Note any discoloration, obvious spills, cuts, fraying, or other unusual characteristics on the mat sampling log.
9. Mat Vacuuming Procedure:
    - Wear clean latex or nitrile gloves while handling vacuuming equipment and while vacuuming the mat.
    - Check that the vacuum, hoses, and nozzle are clean; assemble the machine.
    - Open a vacuum bag package; remove one vacuum bag; place any remaining bags in clean, sealed plastic bag.
    - Label the vacuum bag with the sample number, place it in a reclosable plastic storage bag, and weigh the reclosable plastic storage bag and vacuum bag together on the scale; record the measured weight to the nearest 0.01 gram on the mat sampling log.
    - Place the vacuum bag in the vacuum.
    - Close and secure the vacuum housing.
    - Vacuum the mat with direct contact of the nozzle, making nozzle-width passes from right to left over the length of the entire mat (approximately 1 minute for full coverage); repeat this procedure across the width of the mat; vacuum any areas on the mat with visible remaining dust for 30 seconds. Total vacuuming time should be 2-3 minutes. Turn the mat over (fiber side down on the envelope); strike the back of the mat three times with the flat side of the wooden rod provided for this purpose (this

causes additional soil still in the mat to fall onto the surface of the envelope); remove the mat; vacuum the inside of the envelope for 15 seconds, ensuring full coverage and removing any visible dirt or dust that fell from the mat during the procedure; place the mat in original box for disposal; place the envelope in a lined garbage can and close the lid. Do not raise dust in any disposal operation.

- Disassemble the vacuum in the specified area; open the housing and remove the bag, being careful not to damage the bag or lose any contents. If a proper seal was maintained, the inside housing will be relatively clean. Note on the mat sampling log if the seal was broken and the inside of the machine was soiled.
- Carefully expel air from the bag by folding the cardboard facing over and gently squeezing the bag. Place the entire bag in its labeled quart-size reclosable plastic storage bag and seal it. Check that the sample number listed on the filter bag and reclosable plastic storage bag matches the sample number on the sample tag.
- Weigh the vacuum bag and reclosable plastic storage bag on the scale. Note the filled bag weight on the mat sampling log. The difference in weight before and after vacuuming the dust mat is the total mat dust weight.

10. Decontamination/Disposal Procedure:

- Wipe out the interior vacuum housing and port with damp disposable wipes or brushes. Be sure to clean both inside and outside the apparatus. If dust is obvious or wipes show soiling, repeat until the disposable wipes show no soiling.
- Clean the hose and nozzle by washing them with soap and water, passing cleaning brush down the hose until clean. Be sure to clean both inside and outside of the hose and nozzle. Rinse the hose and nozzle with distilled water, and dry.
- Clean the vacuum table area between each sampling with damp disposable wipes until clean.
- Dispose of all cleaning materials in a lined garbage can with a closing cover. If using brushes, clean with soap and water and dry. Remove and dispose of gloves between each sample.
- At the end of each sampling session, remove trash bags from garbage cans, if full, and replace; damp mop the processing area. Clean the laboratory; clean all sampling equipment; notify a supervisor of any problems or material requiring disposal.

11. Records:

- Double-check all logs and inventory forms for accuracy, completeness, and legibility. Store records in a secure location.
- Disposal of all materials shall be in accordance with the processing lab's procedures and the procedures discussed above.

12. Preparation of Samples for Shipment:

- All reclosable plastic storage bags will be checked for proper seal (reseal or re-bag any leaking bags), compared to the mat sampling log for accuracy, and entered by sample number on the COC form. A COC form will be completed and signed for each box or container shipped. One copy of the form will be enclosed in a plastic bag in each package. After custody transfer to SVL, the signed copy of the COC shall be

provided to the supervisor. All containers will be sealed in accordance with sample transport and shipping procedures.

13. Forms Required (see Appendix C):
    - Master log.
    - COC forms.
    - Logbook.

### *2.1.14 Sample Preservation, Transportation, and Shipment*

After collection, soil and dust samples are secured in plastic garbage bags, sealed with custody seals, placed in coolers in the sampling vehicles, and transferred to the banking room at the TerraGraphics office in Kellogg at the end of each day, where the coolers are also custody-sealed. Water samples are preserved with nitric acid to a pH less than 2.0 and refrigerated to less than or equal to 4 degrees Celsius. The holding refrigerator is custody-sealed as well.

All soil samples are taken to SVL for drying and sieving. Dust samples are sieved and weighed. When samples are ready to be sent to SVL for drying and/or sieving, they are assigned lab identification numbers and "first-generation" COCs are completed. Samples are transported in batches of 20 in custody-sealed plastic garbage bags within custody-sealed coolers. The initial COC is all that is needed for samples that are also analyzed at SVL. Samples that have been dried and sieved and will be analyzed through CLP are brought back from SVL with the first-generation COCs, and stored under custody seal until shipment. The FORMS II Lite software is used to create the CLP-required Traffic Report/Chain-of-Custody (TR/COC), which will be packaged in each cardboard box with the soil or dust samples and shipped to the assigned CLP laboratories via overnight FedEx delivery. The maximum holding time for soil and dust samples is six months.

All water samples are analyzed at SVL. They are delivered to the laboratory in custody-sealed coolers accompanied by COCs.

Dust samples are also weighed at SVL after sieving. Samples containing at least 1.0 gram of material are analyzed by CLP, while those with less than 1.0 gram are analyzed at SVL. If a mat sample is known to weigh less than 1.0 gram (Step 9 in section 2.1.13.3), it will not be taken to SVL for sieving and weighing, but will instead be placed on a COC for sieving and analysis at SVL.

### *2.1.15 Sample Drying, Sieving, and Homogenizing*

Soil and dust samples will be submitted to SVL for drying and/or sieving, and homogenizing. Soil samples will be dried completely at a temperature of 121 degrees Celsius. After drying is complete, samples will then be hand-sieved through a -80 mesh sieve while at the same time homogenizing the sample. The full SOP for drying and sieving is provided in Appendix D.

In cases where soil samples exceed two pounds in weight, SVL recommends using the riffle splitting technique to create more uniformity in the analysis of larger samples. The following procedure of riffle splitting will be implemented by SVL for samples larger than two pounds:

- A stainless steel riffle splitter will be used. The splitter openings are 0.5 inch in size. The splitter divides the sample into two equal portions. The samples are collected on

each side of the splitter in aluminum pans. The analyst performing the work wears clean gloves.

- The process starts with a clean splitter and pans (between samples, the splitter and pans are cleaned with compressed air). The oven-dried sample is poured slowly through the riffle splitter. All material retained on the top of the splitter (> 0.5 inch in size - normally rocks and roots) is discarded. Any soil clods are broken by hand and allowed to pass through the splitter. After the first split, the right side material is retained and the left side material is discarded. The sample is split in this manner several times until about one to two pounds of material remain in the collection pan on the right side of the splitter. The sample from the right side of the splitter is the sample retained for sieving. It makes no difference which side is retained, but to provide consistency, the right side is retained. The sample is then sieved and bagged in the normal manner.

## 2.2 Analytical Methods Requirements

The analytical methods and requirements will follow USEPA's CLP SOW for inorganic sample analyses (USEPA 2010a). The detection limits set under this contract require that ICP-AES be used for analysis in order to obtain the appropriate detection limits as shown in Table 2.

## 2.3 Quality Control Requirements

A summary of Quality Control checks, frequency, and total estimated numbers of QC samples for the project is provided in Table 3.

### *2.3.1 Field QC Requirements*

The laboratory QA/QC will follow the guidance for USEPA's CLP. One rinsate blank per sampling team will be collected every week and submitted blind to the laboratory. One field blank will also be submitted each week. For the house dust survey, rinsate and field blanks will only be used during the mat vacuuming stage because no equipment decontamination is needed while placing and retrieving mats and collecting vacuum samples.

Rinsate blanks ensure equipment is properly decontaminated, reducing the risk of cross-contamination between different depths and areas. Field blanks ensure that the distilled water used to clean the sampling equipment is not contaminated, which could affect soil sampling results. The following procedure will be used to prepare a rinsate blank:

- Spray a stream of distilled water on a decontaminated piece of equipment, such as a tent stake.
- Collect the water directly into a 1L polyethylene container, without touching the opening of the bottle.
- Add nitric acid.
- Screw on the cap.

Field blanks are prepared by filling a 1L polyethylene container with a stream of distilled water directly from the distilled water container. Field blanks are also preserved with nitric acid.

Field duplicates and splits will be used as QC indicators to ensure that field sampling and laboratory methods are consistent and reliable. One field duplicate will be completed for every 20 samples. When using a soil probe, duplicates are prepared by filling a second plastic sample bag with the same homogenized soil from the most recent sample area and interval and marking the soil tag as a duplicate sample. When using a bar/shovel to excavate sampling pits, duplicates will be collected by repeating the sampling procedure for every twentieth sample interval and location. For example, if the twentieth sample is the A level of a yard, a duplicate sample will be collected following the protocol under 2.1.1, using the same sample hole locations, and will be marked as a duplicate sample on the sample tag.

One split sample will be prepared for every 20 samples. Split samples will be prepared during sample banking. Duplicate samples will not be made into split samples. To prepare a split sample, the soil will be thoroughly mixed by hand, and divided into another plastic sample bag. The new sample bag and sample tag will be marked as a split sample.

For dust samples collected during the house dust survey, a duplicate mat will be placed and collected for every 20 mats. Each field duplicate consists of a second dust mat placed directly next to the original dust mat. Split samples will be prepared for vacuum bag samples for every 20 samples collected. The split vacuum bag samples are collected in the same manner as the original samples then homogenized, divided in half, and placed in separate containers.

In addition, laboratory QA/QC is checked externally by submitting dust mat standards blind to the laboratory for analysis. Mats are loaded with approximately 10 grams of a National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) (#2587 or #2586) containing 3,242 mg/kg or 432 mg/kg lead and 13.7 mg/kg or 8.7 mg/kg arsenic, respectively. A pre-loaded mat standard is inserted for approximately every 20 dust mat samples collected and submitted to the laboratory for analysis.

### *2.3.2 Laboratory QC Requirements*

The laboratory QC requirements will follow the guidance outlined in the USEPA CLP Guidelines for Inorganic Data Review (USEPA 2010b). The Laboratory QC will include appropriate duplicates, control samples, spikes, blanks, detection limits, holding times, dilutions, etc. as outlined in the guidance document. According to CLP protocol, no QC is performed for field blanks. Drinking water samples analyzed by SVL are reported at a Level I designation; associated EDDs only contain laboratory control samples and preparation blanks.

**Table 2 2011 Analytical Methods, Detection Limits, and QA/QC Parameters for Soil, Dust, and Water**

| Analyte | CLP Analytical Method | Target Detection Limit | Accuracy (% Recovery) | Precision (RPD) | Completeness |
|---|---|---|---|---|---|
| Arsenic | ICP-AES | 10 mg/kg (soil/dust)<br>3 µg/L (water)[1] | 75-125 | ± 35 % | 95% |
| Lead | ICP-AES | 50 mg/kg (soil/dust)<br>3 µg/L (water)[1] | 75-125 | ± 35 % | 95% |
| Cadmium | ICP-AES | 0.2 µg/L (water)[1] | 75-125 | ± 35 % | 95% |

[1] Water samples to be sent to SVL for analysis.

**Table 3 Quality Control Checks**

| QC Check | Frequency | Total Number |
|---|---|---|
| Blanks | | |
| Field blank | 1:week | ~35 |
| Rinsate blank | 1:sampling team:week | ~120 |
| Spikes | | |
| Matrix spike | 1:Batch | 400-500 |
| Laboratory duplicate | 1:Batch | 400-500 |
| Duplicates and splits | | |
| Field duplicates | 1:Batch | 400-500 |
| Field splits | 1:Batch | 400-500 |

Note: one batch equals approximately 20 samples.

## 2.4 Instrument Calibration and Frequency

Instrument calibration and frequency will follow the guidance outlined in the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA 2010b). Laboratory analysis will use ICP-AES instrumentation with appropriate calibration and frequencies for the analysis of arsenic and lead.

## 2.5 Data Acquisition Requirements

Data quality will be evaluated using control metrics described in sections 2.5.1-2.5.5.

### *2.5.1 Precision*

Precision is a measure of data variation when more than one measurement is taken on the same sample. The precision estimate for duplicate measurements can be expressed as the relative percent difference (RPD):

$$RPD = \frac{(C_1 - C_2)}{c} x100\%$$

where: $C_1$ = concentration for duplicate #1
$C_2$ = concentration for duplicate #2
c = mean concentration

Acceptable precision limits are based on past databases, as defined by the USEPA and are presented in Table 2 above. Duplicate measurements will be obtained for each set of soil or dust samples submitted and analyzed. Evaluation of data precision will follow *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA 2010b).

### *2.5.2 Accuracy*

Accuracy of laboratory analysis is assessed by measuring standard reference material and spiked samples. Standard reference materials are utilized to calibrate laboratory measurement instruments.

Splitting a sample into two portions, spiking one portion with a known quantity of a constituent of interest, and analyzing both portions determine spike recovery. Spike recovery is expressed as percent recovery:

$$Percent\ Recovery = \frac{(SSR - SR)}{SA} x\ 100\%$$

where: SSR = Spike Sample Result
SR = Sample Result
SA = Spike Added

Acceptable spike recovery limits are based on past data sets as defined by USEPA and are presented in Table 2 above. Evaluation of accuracy will follow *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA 2010b).

The soil and dust CRQLs for lead and arsenic are 50 mg/kg and 10 mg/kg, respectively. The typical lead and arsenic spike material concentrations are at 4 mg/kg and 8 mg/kg, respectively. In order to properly evaluate spike percent recovery, the spike concentration should typically be one to five times the native concentration. For soil and dust analysis on this project, SVL and CLP laboratories use an arsenic spike concentration of 100 mg/kg arsenic and a lead spike concentration of 700 mg/kg lead.

### *2.5.3 Representativeness*

This term expresses the degree to which the data accurately and precisely represent actual conditions or characteristics of the site. Representativeness may be evaluated using background samples collected from areas isolated from, yet similar to, the site and analyzed for the same constituents.

### *2.5.4 Completeness*

Completeness is an estimate of the amount of valid data obtained from the analytical measurement system for a given set of data. Percent completeness is defined as the number of samples analyzed that meet the data quality goals, divided by the total number of samples analyzed, multiplied by 100. The completeness goal for this project is 95%.

$$PercentCompleteness = \frac{(N_{nq})}{N_t} x\ 100\%$$

where: $N_{nq}$ = number of samples analyzed that meet the data quality goals
$N_t$ = total number of samples analyzed

### *2.5.5 Comparability*

Using standard USEPA protocols; all matrix-specific samples will be collected, processed, and analyzed at sufficient detection limits, precision, and accuracy for correlation with previous data.

## 2.6 Data Management

### *2.6.1 Data Validation*

Data validation will use the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA 2010b), and the *USEPA Guidance on Environmental Data Verification and Data Validation* (USEPA 2002b), which contain details on technical data review criteria for quality control metrics discussed in Section 2.5. Due to the large number of samples associated with this project, USEPA staff will perform full data validation and issue a data validation report for one out of every 20 Sample Delivery Groups (SDGs) received from CLP laboratories. Each SDG contains results for 20 or fewer samples from a CLP lab. In addition, USEPA will perform electronic data validation on each SDG using its EXES data manager system. Electronic data validation through this system includes evaluation of precision and accuracy as discussed in section 2.5, and applies qualifiers to data provided by CLP laboratories according to USEPA guidelines (USEPA 2010b). TerraGraphics will periodically check that the USEPA electronic data validation system correctly follows USEPA guidelines (USEPA 2010b) and is consistent with QC requirements outlined in Section 2.5. For data obtained from SVL, TerraGraphics will complete data QA/QC as described in Section 2.5 on every SDG received.

When reporting lead and arsenic results from field duplicate and/or field split pairs, the highest concentration of each analyte will be reported to ensure human health exposures are reduced.

### *2.6.2 Data Recording*

The USEPA Region 10 Sample Management Office will provide TerraGraphics access to CLP laboratory results for each SDG and associated documentation, including data validation reports, through the EXES data manager system. TerraGraphics will download from the EXES data manager website electronic spreadsheets containing laboratory results for each SDG and will add downloaded results to the Basin database.

Both hard copies and electronic versions of the soil and water data analyzed by SVL will be delivered by SVL after they have passed their internal checks. Once QA/QC procedures are complete, these results will be finalized in the database.

### *2.6.3 Data Transformation*

The raw data will be available for third party data transformation.

### *2.6.4 Data Transmittal*

Soil, dust, and water data will be transmitted in Microsoft (MS) Excel™ files. These files will be imported into the Basin database system.

### *2.6.5 Data Reduction*

The individual data collected from this project will eventually become part of the Basin ICP Database used to track remediation of Basin properties. Data may be summarized to show average concentrations in specific towns and discrete areas (i.e., driveways, gardens, yards, ROWs, etc.).

### *2.6.6 Data Analysis*

The data will be compared to the OU3 ROD action levels to determine if removal or barrier enhancement is required. Following the completion of sampling and data validation and verification, the data will be summarized by depth interval, town, sampling location (yard, garden, etc.), and by property in a data summary report. Similarly, house dust samples collected during the house dust survey will be summarized by town in a data summary report, following completion of sampling and data validation and verification. Residential water data will be compared to drinking water standards in the OU3 ROD.

Individual participant results will be summarized in a letter and delivered to each participant upon final data approval (Appendix E).

### *2.6.7 Data Tracking*

This project will use FORMS II Lite Software to track sample numbers and forms for those samples analyzed by CLP. SQL Server 2005™ and Excel™ will be used to track water sample numbers and soil sample numbers analyzed at SVL on quick turnaround.

### *2.6.8 Data Storage and Retrieval*

The data will be stored in electronic form in the Basin ICP SQL Server 2005™ database. In addition, hard copies will be filed with USEPA, IDEQ, PHD, and TerraGraphics.

# Section 3.0 Assessment/Oversight

## 3.1 Assessment and Response Actions

### *3.1.1 Readiness Review*

Two weeks prior to the start of sampling, TerraGraphics' Project Manager and Project QA Manager will perform a readiness review. A checklist of supplies, logistics, and other relevant issues will be reviewed and problems will be identified with time for correction prior to initiation of sampling.

### *3.1.2 Surveillance*

TerraGraphics' Project Manager will be briefed daily on the status and progress of the current sampling program by the Sampling Crew Coordinator. It will be his/her responsibility to ensure that all specified requirements are being fulfilled as outlined in this SAP/QAPP.

### *3.1.3 Technical Systems Audits*

One technical system audit is scheduled for soil sampling in August 2011. TerraGraphics' Project QA Manager will review the equipment, personnel, training, procedures, data entry and proofing, and records keeping, determining if they conform to this QAPP. A memorandum will be generated identifying any weakness in management structure, policy, practices, or procedures. The memorandum will be discussed with the TerraGraphics Project Manager prior to distribution to IDEQ and USEPA's project managers and QA coordinator for review and concurrence of any corrective actions. Two technical system audits are scheduled for the house dust sampling: once while placing and retrieving mats, and again when vacuuming mats. One memorandum for the house dust survey will be generated.

### *3.1.4 Audit of Data Quality (ADQ)*

The data will undergo internal QA/QC, from which an internal memorandum will be generated to identify any data quality problems. Separate QA/QC memos will be completed for the house dust survey: one for dust mat samples and one for vacuum bag samples. The QA/QC memos will be submitted to the project QA Manager who will make decisions with regard to modification and/or correction of any identified problems.

### *3.1.5 Peer Review*

An internal peer review will be completed at TerraGraphics on all data sets, memoranda, and reports. In addition, an external review will be completed by participating agencies (IDEQ and USEPA).

## 3.2 Reports to Management

The Technical Systems Audit memorandums will be distributed to the project team members in September 2011. After the completion of the sampling season, data summary reports will be compiled by the second quarter of 2012. These reports will summarize the data in a confidential manner.

# Section 4.0 Data Validation and Usability

## 4.1 Data Review, Validation, and Verification Requirements

USEPA Region 10 will provide full data review and validation on every twentieth SDG received from CLP, and will provide electronic data validation of all SDGs received from CLP based on the current CLP and QA/QC requirements as outlined in the above Sections of this SAP/QAPP. The data will then be distributed to TerraGraphics personnel, who will review every SDG and generate an internal QA/QC memorandum evaluating and verifying that DQOs were met based on the requirements outlined in this SAP/QAPP. The report will be sent to the project QA Manager who will make decisions for any potential corrections that need to be made to the data. For the data provided by SVL, TerraGraphics personnel will provide the data review and validation based on the requirements discussed above.

## 4.2 Validation and Verification Methods

Data are uploaded and examined daily by the individual investigators and/or the CLP laboratory to ensure data are acquired within the specified range. Corrective action is taken when errors or anomalies are found, as outlined in ISM01.2 (USEPA 2010a).

Specific data validation procedures discussed in Section 2.5 and 2.6 are applied to all data acquired from these sampling efforts. Field and laboratory validation qualifiers applied at each level of the data validation process will be part of the final database to verify the validity of each measurement. Procedures for data verification and validation will be conducted per USEPA guidelines (USEPA 2002b, 2010b) and as described in Section 2.0.

## 4.3 Reconciliation with Data Quality Objectives

The objectives of the sampling in the Coeur d'Alene Basin are to identify properties where i) human health exposures to dust may occur, ii) soil lead and arsenic levels exceed the soil action levels for cleanup, and iii) private residential well water may exceed the MCLs for lead, arsenic, or cadmium. Laboratory data validation and verification will be reconciled with the DQOs put forth in this SAP/QAPP by USEPA Region 10 (and TerraGraphics personnel). The review will summarize data and QC deficiencies and evaluate the impact on overall data quality, assign data validation qualifiers as necessary, and prepare an analytical data validation report, which is sent to TerraGraphics in hard copy form.

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# Appendix B – Sampling Decision Tree and "Large" Property Sampling Approach – Rev. 5, Final

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**From:** Mara Moscato, TerraGraphics, Kellogg
Susan Spalinger, TerraGraphics, Moscow

**Date:** September 23, 2008

**Subject:** Sampling decision tree and "large" property sampling approach – Rev. 5, Final

**Job Code:** 2005-4210

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This memo summarizes the sampling issues discussed and decisions made during the Basin Property Remediation Program (BPRP) 2007 Lessons Learned/Issues Meeting with the United States Environmental Protection Agency (USEPA), Panhandle Health District (PHD), Idaho Department of Environmental Quality (IDEQ), and TerraGraphics on November 27, 2007; a conference call with IDEQ and TerraGraphics on January 23, 2008; a conference call with USEPA, IDEQ, PHD, and TerraGraphics on March 19, 2008; and a conference call with USEPA, IDEQ, and TerraGraphics on May 8, 2008. This memo is a revision of the June 19, 2008 memo entitled, *Sampling decision tree and proposal to sample "large" properties – Rev. 4*.

The first section of this memo summarizes the decision-making process to determine whether or not a parcel should be sampled under the BPRP. The second section summarizes the decision made regarding sampling outside the Institutional Controls Program (ICP) Administrative Boundary. The third section discusses the approach to sampling multiple-acre properties.

For this memo, the following definitions are used:

- Parcel: a piece of land assigned a 12 digit identifier and taxed by the assessor.
- Passable road: a road that leads to a residence, business, or common use area on which a small car can pass.

**Sampling Eligibility under the BPRP**

Figure 1 illustrates the decision-making process to determine whether or not a parcel is eligible for sampling and potential remediation under the BPRP. Parcels must be served by a road that is maintained by the state, federal agencies, counties, or cities. If a road is not maintained by the state, federal agencies, counties or cities, it will be classified using the above definition. In general, the following types of parcels within the ICP boundary are eligible for sampling and potential remediation.

- A parcel containing a home that existed prior to September 1, 2007 or that has an active building permit with an application date prior to September 1, 2007.
- A parcel that is maintained with an adjoining parcel containing a home that existed prior to September 1, 2007 or that has an active building permit with an application date prior to September 1, 2007.
- An undeveloped or vacant parcel smaller than one acre in size, located within a 250 foot radius of two or more inhabited homes, in a neighborhood that existed prior to September 1, 2007. If a property is larger than one acre, IDEQ will be consulted for sampling eligibility.
- A parcel in a subdivision platted prior to September 1, 2007. Undeveloped subdivisions that meet this criteria will not be prioritized, but if these parcels are still undeveloped as the remediation program nears completion, they will be sampled (and remediated, if necessary) at that time.
- A common use area such as a park or sports field that existed prior to September 1, 2007.
- A parcel containing an operating business that existed prior to September 1, 2007.

The existence of an active building permit with an application date prior to September 1, 2007 will be used to make an eligibility decision if there is uncertainty in whether a home existed prior to September 1, 2007. Building permits have expiration periods, and city and county building departments will be consulted to confirm permit status, if needed.

Some parcels are eligible for sampling under these definitions but may have unusual situations. When it is unclear whether or not sampling should occur, IDEQ and EPA will be consulted.

**Sampling Outside the ICP Boundary**

Three communities abut the ICP boundary in the Lower Basin: Bentley Creek area, Fern Creek area, and East Canyon Road (see Figure 2). Several properties in these communities were sampled prior to creation of the ICP boundary. Based on a review of those sampling results, approximately half of the properties previously sampled in these areas (outside the boundary) require remedial action in at least one area of the property, most often rights-of-way, parking areas, or driveways. These communities will be sampled, although properties within the ICP boundary will be given priority.

Other than the communities discussed above, parcels that are outside the ICP boundary will not be solicited for consent. If an owner of a property outside the ICP boundary requests to have his or her property sampled, and the property fits the above eligibility criteria, the property will be

included in the BPRP, although it will not be prioritized unless a child under seven years old or a pregnant woman lives at the residence. The ICP boundary may not represent where contaminants have come to lie, and the collection of data outside the boundary will be used to assess contaminant extent. At this time, roads crossing the ICP boundary will not be sampled to evaluate the boundary location.

**Sampling of "Large" Properties**

The decision tree discussed above and illustrated in Figure 1 may lead to the sampling of a "large" parcel (i.e., a property with ≥ 2 acres of sampling areas defined in the Sampling and Analysis Plan / Quality Assurance Project Plan (SAP/QAPP) for the 2007 Property Sampling in the Coeur d'Alene River Basin of Idaho (IDEQ 2007)). Due to the need to focus remedial efforts on property areas where exposures are likely to occur, questions arose as to whether or not these large properties should be sampled and remediated in their entirety. In order to potentially reduce the acreage sampled and remediated on large properties, IDEQ and USEPA decided that, with the exception of any areas used by children, sampling and remediation of unmaintained (i.e., unused) areas on large rural properties will no longer occur. Sampling will focus on the higher use areas of the property and exclude unused portions. For instance, if there is a large field located a distance from the house with a path leading to a picnic area, the path and the picnic area would be sampled, but the field may not be sampled.

The 2008 SAP/QAPP (IDEQ 2008) has been updated to specify that unused or unmaintained areas with tall grasses and/or weeds will *not* be sampled unless evidence of child use is apparent. In addition, IDEQ will accompany sampling crews on selected large properties for training purposes. Based upon the results of the training, IDEQ may delegate sampling decisions on some large properties but will also identify situations that will require IDEQ consultation. IDEQ will continue to provide contractor oversight and sampling crew training to ensure sampling decisions on large properties are consistent with IDEQ's direction. Training will occur on at least an annual basis. IDEQ will update USEPA on large sampling issues during the USEPA-State project conference calls.

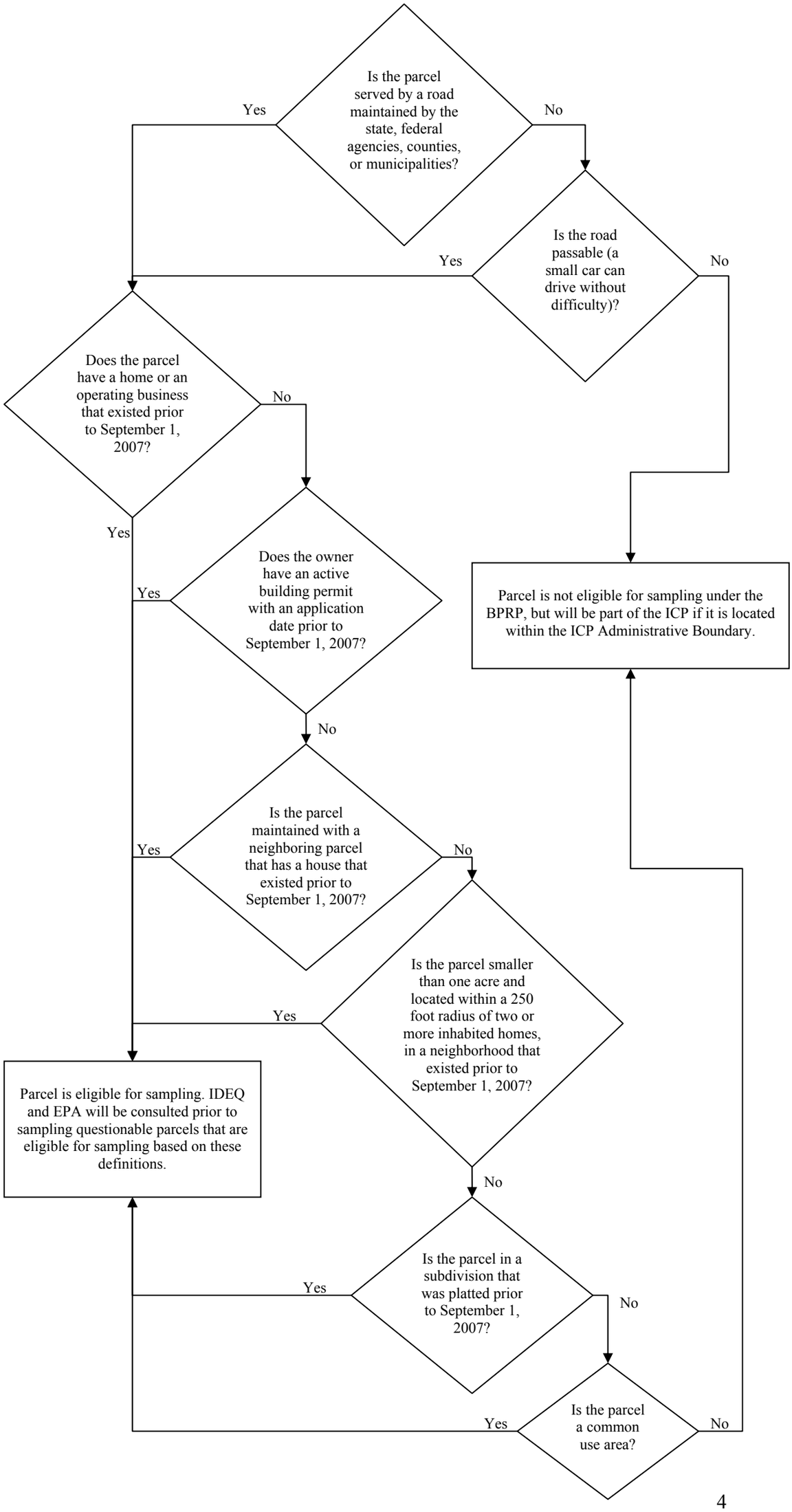
This modification would still achieve human health goals identified in the ROD because it assumes that no children or pregnant women are using these unmaintained areas so exposure to contaminated soils is not currently occurring. Any future use of these areas will fall under control of the ICP.

**References**

Idaho Department of Environmental Quality (IDEQ). 2007. *Final Sampling and Analysis Plan (SAP)/Quality Assurance Plan (QAPP) for the 2007 Property Sampling in the Coeur d'Alene River Basin of Idaho*. Prepared by TerraGraphics Environmental Engineering, Inc. June 2007.

Idaho Department of Environmental Quality (IDEQ). 2008. *Final Sampling and Analysis Plan (SAP)/Quality Assurance Plan (QAPP) for the 2008 Property Sampling in the Coeur d'Alene River Basin of Idaho– Revision 1*. Prepared by TerraGraphics Environmental Engineering, Inc. September 2008.

**Figure 1 Determination of Sampling Eligibility**



Not a legal document. This map was produced using information obtained from several different sources that have not been independently verified. Information does not represent survey data and should be used for conceptual planning purposes only.

DRAFT

N W E S

SERVICE CREEK
Service Creek
Rantenan Creek
RANTENAN CREEK
Bentley Creek
FERN CREEK
KELLY
ROSE CREEK
BENTLEY CREEK
Fourth of July Canyon
CANYON RD
Fern Creek
INTERSTATE 90
INTERSTATE 90
RAMP
RAMP
STATE HIGHWAY 3
Fourth of July Creek
S CHOOLHOUSE LOOP
THUNDER
POPLAR
RIVER

- Streets and Roads
- Interstate 90
- ICP Administrative Boundary (May, 2007)
- Bentley Creek Road Area Properties
- East Canyon Road Area Properties
- Fern Creek Road Area Properties
- Other Properties

DRAFT

Information source for this map include:
Kootenai County Tax Assessor

500 250 0 500
Feet
1:11,000

TerraGraphics
Environmental Engineering, Inc.
www.TerraGraphics.com

| | | | |
|---|---|---|---|
| FILE | 08_Bunker / ferncreek | REQUESTOR | M. Moscato |
| PRINT DATE | February 6, 2008 | PROJECT MANAGER | S. Spalinger |
| PROJECT NUMBER | 2005-3210 | CARTOGRAPHER | B. Bailey |

PROJECT NAME
Basin Yard Program

**Bentley Creek, Fern Creek, and East Canyon Road Communities**

Figure 2

# Appendix C – Sampling Forms

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1005 West McKinley Ave • Kellogg, Idaho 83837 • (208) 783-5781
www.deq.idaho.gov/BunkerHillSuperfundSite

C. L. "Butch" Otter, Governor
Toni Hardesty, Director

[Date]

[Name]
[Address]
[City, State Zip]

Re: Address (Parcel #)

Dear [landowner];

As you may or may not know, your property is located in the Bunker Hill Superfund site. Over the years, soil and water within the Superfund site have become contaminated with lead, arsenic, and cadmium. Contaminated gravel and soil have been used in some places as fill material in some yards, driveways, play areas, and rights-of-way within the Site. The Idaho Department of Environmental Quality (DEQ) and our partners are committed to sampling areas where people live, work, and play such as: recreation areas, trails, yards, pastures and corrals. As part of this effort, we will soon be testing levels of contamination in your area to help us plan our cleanup needs.

To help gather data and plan where cleanup is needed, our contractor, TerraGraphics Environmental Engineering, will need to take soil samples from your yard and request water samples from your tap (if you have a private well). If the test results show that the soil or water on your property is contaminated at unsafe levels, we will contact you again to discuss cleanup needs for your property. If the test results do not show unsafe levels of contamination, no cleanup will be needed.

There will be no cost to you for the sampling or for any necessary cleanup, and you will be provided with a copy of your test results. It is important to keep the test results in your records since state and federal laws require property owners to disclose the known presence of hazardous materials or substances to potential buyers.

Attached are a copy of the "Basin Yard Sampling Consent for Access" for your records and a "Property Sampling Participant Information Form." *Please read the consent for access, fill out the information form, and return it in the enclosed self-addressed, stamped envelope.* You can use the *comment section* to let us know how to best contact you, or for information we should know about entering your property.

*Your participation is important.* Thousands of properties with high levels of lead and arsenic have already been cleaned up, resulting in improved property values, reduced children's blood lead levels, and increased vegetation growth and healthy wildlife habitat throughout the area.

If we do not hear from you, we will follow up with you to see if you have any questions. In the meantime, please feel free to contact us about the sampling or cleanup at (208) 786-1206 (TerraGraphics), or (208) 783-5781 (DEQ). We appreciate your assistance in this important cleanup effort.

Sincerely,

Scott Peterson
Coeur d'Alene Basin On-Site Coordinator

# Basin Yard Sampling Consent for Access (Participant keeps this half sheet)

The Idaho Department of Environmental Quality (IDEQ), in cooperation with the U.S. Environmental Protection Agency (EPA), is conducting sampling in the Coeur d'Alene Basin to determine the extent of lead and arsenic contamination. This sampling is being done at no cost to the participants.

Participation by granting access is voluntary and has benefits to the property owners. Sampling determines if a property is contaminated or not and if remediation is required. If remediation is necessary and subsequently completed then exposure to toxic materials is reduced and real estate transaction problems associated with the Superfund designation are minimized. However, choosing not to participate could lead to continued exposure to toxic chemicals, real estate transfer problems, or increased liability for property owners. Participation is encouraged.

Environmental Sampling – personnel will collect samples from the property. The following samples will be collected and analyzed for lead and arsenic concentrations:

- ♦ Interior house dust from a vacuum cleaner bag
- ♦ Property soil
- ♦ Well water (only if your drinking water comes from a domestic well)

The results of samples collected and tested from your property will be mailed to the property owner.

**PARTICIPANT CONSENT**: I agree to this sampling and hereby give my consent to the DEQ, EPA, their representatives, and persons acting at their request to enter the property described and to collect the described samples.

I understand that IDEQ will inform me in writing of my results. I further understand that participation is not mandatory and that I may withdraw my consent in writing by sending such a request to the IDEQ in Kellogg.

I may contact Scott Peterson, IDEQ Coeur d'Alene Basin On-site Coordinator, at (208) 783-5781 if I have any questions.

Idaho Department of Environmental Quality
Coeur d'Alene Basin Property Sampling Participant Information Form

***This side is for Participant Use:*** Participant Name: _____

***Physical Address of Property:***

**Street Address Number** _____ **Unit Type:** APT LOT Suite **Unit Number** _____

**Street Direction** E W N S NE NW SE SW

**Street Name** _____

**Street Type** ST RD DRIVE AVE LOOP LANE
BLVD TER COURT CIRCLE WAY TRAIL

**City** _____ **Zip** _____

(_____)_____-_____ (_____)_____-_____ (_____)_____-_____
**Home Phone Number** **Cell Phone Number** **Work Phone Number**

**Participant Mailing address (if different than property address):**
Address _____
City _____ State _____ ZIP _____

**Private Drinking Water Well:** Yes No UNKNOWN

**Do you have an outside dog?** Yes No

**Any immediate plans to move?** Yes No **Are you 18 years of age or older?** Yes No

**How long have you lived at this address?** _____ years _____months

**Are you a(n):** Owner
Renter
Property Manager *
Other *
If Other, what?: _____

Please fill out this box if you are not the owner:
Owner Name_____
Mailing Address _____ City _____
State _____ ZIP _____ Home Number (_____)_____-_____
Cell Number (_____)_____-_____ Work Number (_____)_____-_____

** Property Manager is defined as a person who manages the property financially, designated by the owner (e.g., landlord). Other refers to someone who is a custodian, neighbor, babysitter, or someone other than the owner, renter, or property manager.*

***Child Information:***

*To help control exposure to lead and arsenic by young children and pregnant women, a soil removal program has been proposed to continue for this summer. Please list by name and age all children 6 years of age or younger living in the home. Also, please note if there is anyone who is pregnant at this residence. PLEASE SKIP THIS SECTION if your yard has already been remediated or there are no eligible people living at this residence.*

Pregnant Women in Residence: Yes No Nursing Women in Residence: Yes No

Number of children who live at this residence/property _____

*Please include First & Last Names:*

Name _____ Age ___ yrs. ___mos. Relationship_____
Name _____ Age ___ yrs. ___mos. Relationship_____
Name _____ Age ___ yrs. ___mos. Relationship_____
Name _____ Age ___ yrs. ___mos. Relationship_____

*If you have more than four children, please use bottom or back of form to list additional children.*

***Sampling Consent:*** *(only an owner, renter, or property manager can provide consent to sample)*

I have received and read the *Basin Yard Sampling Consent for Access to Property* Information Sheet and understand that this Form is executed pursuant to all privileges recognized by law.

**Please initial all that apply:**

_____ Please call to schedule a time for the sampling. Best time to call: morning / afternoon / evening
_____ I agree that samplers may take exterior samples even when I am not present during daylight hours.
_____ I agree to dust mat sampling, if a dust program is available.

Resident Comments: _____

_____/_____/_____ _____
Date **Participant Signature**

_____/_____/_____ _____
Date **Interviewer Signature**

Idaho Department of Environmental Quality
Coeur d'Alene Basin Property Sampling Participant Information Form

***This side is for Internal State use only:***

***Note to employees: Always complete both sides of form.***

***General Information:***

**Date _____ Time: _____ : _____ Initials _____**

**Physical Description of property**: _____

**Property Usage:** Commercial w/ possible children (CM1) Commercial w/ NO children (CM2)
Common Use Area (CUA) Vacant Lot Residential

**Property Type:** House Apartment Trailer Duplex Garage Shop

*If in the course of conversation or a site visit you determine issues to be concerned with, please indicate below.*

1. Property cannot be sampled/remediated – steep hillside and/or heavily vegetated land, and not in use.
2. Nothing other than a ROW can be sampled on this property (due to the same reasons in #1)

**Comments:**_____

---

**Was Personal Contact Made?** Yes No
*No contact is classified as not talking with a person.*

**Contact Type:** Property Visit Phone Call Mailed-in form

**If not a mailed-in form and there was no contact made, did you stop because of:**

No Trespassing sign No Soliciting sign No one home

**Did you:** Leave flyers on property Leave message on phone message machine

---

**Are the participants**: HR Not HR No Response

---

**Sampling Refusal:** *(complete only if participant refuses sampling)*

**Why?**

Check Back Contact Landlord Wants more information
Moving/selling home Not interested at all Not currently interested
No EPA Other: _____

---

**Remediation Refusal:** *(complete only if participant refuses remediation)*

Why? _____

---

***Parcel #__ __ __ __ __ __ - __ __ - __ __ __ __** ***GIS ID# __ __ __ __ - __ __ __**

**Map discrepancy?** Yes No

**Map Comments:**_____

**GPS'ed:** Yes No **GPS Data: 05GPS__ __ __ __**

---

***In office use:***

**House ID: __ __ - __ __ __ __** **MH __ __ __ __ __**

[] Previously Sampled (PS) _____
[] Research Required (RQ) _____
Owner []
Address []
Sampling status []
Remediation status []
Other []

[] Previously Remediated (PR) _____
[] Refusal (RF) _____
[] Duplicate Consent _____

---

**Please list additional **parcel and GIS ID#s** here if more than one:*

# Locate Information Sheet

Dear Resident,

In the past, you or the property owner signed a consent form for soil and/or water samples to be collected from your property to be analyzed for lead and arsenic. Your property is being located for utilities, in preparation for sampling. During the next 48 hours, you may see utility crewmembers or notice paint markings on your property. The markings indicate sewer or drain lines, electrical lines, communication cables, water lines, and gas or oil lines. They are not permanent and will gradually fade.

When our crews arrive to collect soil and/or water samples in the near future, they will avoid taking samples directly over these marked areas. If you requested to be contacted in order to schedule a time for sampling, you will still be contacted prior to sampling. If you have any additional information about the locations of sprinkler systems, septic systems, or electric lines that you may have installed, please contact TerraGraphics at (208) 786-1206.

If you have any questions about the locate or sampling process, please contact Abe Hanna at TerraGraphics Environmental Engineering (208) 786-1206. For questions about the yard remediation program, contact Scott Peterson at IDEQ, (208) 783-5781.

**Utility Locate Marking Description**:

| | |
|---|---|
| **Red:** | Electric power lines, cables, conduit and lighting cables |
| **Yellow:** | Gas, oil, steam, petroleum or gaseous materials |
| **Orange:** | Communication, alarm or signal lines, cables or conduit |
| **Blue:** | Potable water |
| **Purple:** | Reclaimed water, irrigation and slurry lines |
| **Green:** | Sewers and drain lines |

<Date>, 2011

<Name>
<Address>
<City, State, Zip>

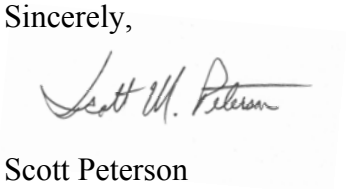
Dear <Name>,

Recently, soil samples were collected from your property with your consent as part of the Coeur d'Alene Basin Property Sampling program. Please find your copy of the Receipt for Samples enclosed. A letter summarizing the sampling results will be mailed to you in approximately seven or eight months.

If you have any questions, please call the Department of Environmental Quality at (208) 783-5781.

Thank you for your time.

Sincerely,



Scott Peterson
Coeur d'Alene Basin On-site Coordinator

RECEIPT FOR SAMPLES

As part of the Idaho Department of Environmental Quality's Basin Property Remediation Program, soil / dust / water samples were collected from:

_____
Address or Parcel City

on _____. Consent was previously given for this activity by
Date

_____ on _____.
Name of person who signed the consent Date of consent

You will receive a letter with the sampling results in approximately 7 to 8 months. If you have any questions, please contact Scott Peterson, Coeur d'Alene Basin On-site Coordinator, at (208) 783-5781.

## CDA BASIN WATER SAMPLE TAG

**Sample Type:** Water

**Analysis:** Metals

**Lab ID# :** _____

---

**Lab ID# :** _____

**Field Sample ID# :**

__ __ - __ __ __ __ - __ __ - __ __ __ __

**Analysis:** Metals

**Source (circle)** Well Other_____

**Use (circle)** Tap Irrigation Both

**TYPE (circle)** Initial Purged Irrigation

**Date** ____/____/____ **Time** _____:_____

**Sampler:** _____

**Location Remarks:** _____

**Rinsate Tool/Field Blank Comments:** _____

**Other Comments:** _____

**Address:** _____

DRW ☐ SW ☐ RB ☐ FB ☐ Resample ☐

## CDA BASIN SOIL SAMPLE TAG

**Sample Type:** Soil

**Analysis:** Metals (Pb & As) Sieve (-80)

**Lab ID# :** _____

---

**Lab ID# :** _____

**Field Sample ID# :**

__ __ - __ __ __ __ - __ __ - __ __ __ __ (-__ __ __)

**Analysis:** Metals (Pb & As) Sieve (-80)

**TYPE (circle)**

Grab Composite

**Depth:** _____

**Date** ____/____/____ **Time** _____:_____

**Sampler** _____

**Sample Location Remarks:** _____

**Other Comments:** _____

**Address:** _____

**# of Holes:** _____ **# of Refusals:** _____

SVL ☐ CLP ☐ DUP ☐ SPL ☐ RSP ☐

## CDA BASIN VACUUM SAMPLE TAG

**Sample Type:** Dust

**Analysis:** Metals (Pb & As) Sieve (-80)

**Lab ID# :** _____

---

**Lab ID# :** _____

**Field Sample ID# :**

__ __ - __ __ __ __ - __ __ - __ __ __ __ (-__ __ __)

**Analysis:** Metals (Pb & As) Sieve (-80)

**TYPE (circle)**

Grab

**Date** ____/____/____ **Time** _____:_____

**Sampler** _____

**Vacuum Type:** _____

**Other Comments:** _____

**Address:** _____

Split ☐

Address: _____ House ID _____ Team: _____

Parcel Number: _____ GISID: _____ Sample Date: _____

Mapper Initials: _____ Mapping Date: _____ Walk-Thru Date: _____ Walk-Thru Initials: _____

| Symbol | Sample Location | Square Footage | # of Holes (Sq. Ft.) | # of Holes Dug | Symbol | Sample Location | Square Footage | # of Holes (Sq. Ft.) | # of Holes Dug |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments:

Paint: Good Poor

Town Map Correct: Yes No

*OTHER MATRICES SAMPLED:*

*DUST Y N*
*WATER Y N*

**BOUNDARIES SHOWN ON MAP ARE NOT SURVEYED AND MAY BE INCORRECT. THEY ARE FOR GUIDANCE ONLY!**

*Scale:*_____ *N*

Address: _____

Address: _____

# INSTRUCTIONS FOR HOMEOWNERS COLLECTING DRINKING WATER SAMPLES

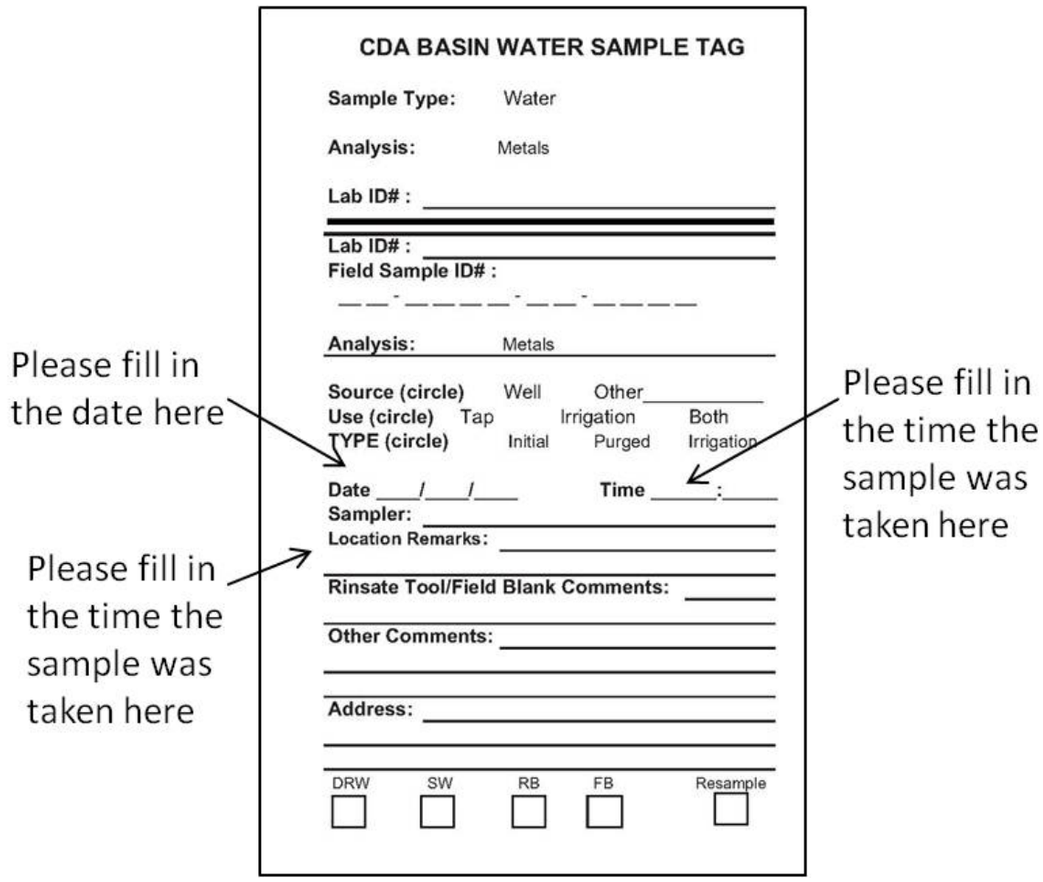
**- The faucet to be used for the samples must NOT have been turned on for at least 6 HOURS prior to sample collection.**
**- The location of the faucet to be used for the sample (i.e. kitchen sink, bathroom sink) should be recorded on the tags provided.**

1. Turn on the **COLD** faucet (remember that this faucet must **NOT** have been turned on for at least 6 hours) and **immediately fill bottle #1.** Then cap bottle #1 and record the time the bottle was filled on the provided tag (see step 4).

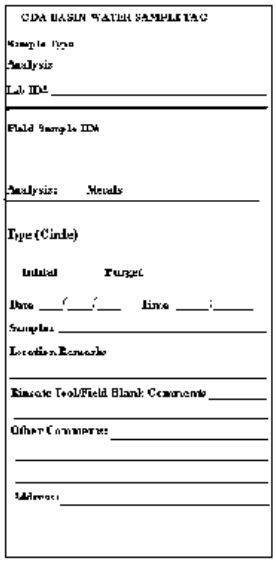
2. Leave the faucet running for 10 minutes.


3. Fill bottle #2. Then cap bottle #2 and record the time the bottle was filled on the provided tag (see step 4).

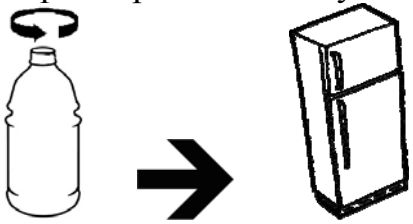
4. Make sure that the time each sample was taken and the location of the faucet are recorded onto the sample tags that were provided.



5. Attach the tag with the time and location of the sample to the corresponding sample bottle with a rubber band.




6. Screw on the cap to each bottle tightly and place both bottles with attached tags in the refrigerator unless you are leaving them for crews to pick up the same day.



**CUSTODY SEAL**

SIGNATURE _____

DATE _____

TerraGraphics
Environmental Engineering, Inc.
121 S. Jackson Street
Moscow, Idaho 83843
(208) 882-7858

TerraGraphics
Environmental Engineering, Inc.

108 W. Idaho
Kellogg, ID 83837
(208) 786-3032 Fax (208) 786-1209



# CHAIN OF CUSTODY RECORD

| Data to: svldata@TerraGraphics.com | Project Name: Basin Yards | | | | | Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Invoice to: Terragraphics | Project Code : | | | | | | | | | | | Normal T.A.T. |
| TO:SVL | | SAMPLE DESCRIPTION | | | | | | | | | | |
| Lab ID | Sample Date | Water | Soil | Dust | Other | | | | | | | REMARKS |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | | | | | | | Dry and Sieve to -80 Mesh |

| Relinquished By | Date/Time | Received By: (Signature) | Relinquished By: (Signature) | Date/Time | Received By: (Signature) |
|---|---|---|---|---|---|
| Relinquished By: (Signature) | Date/Time | Received By: (Signature) | Date/Time | Remarks | |

TerraGraphics
Environmental Engineering, Inc.

108 W. Idaho
Kellogg, ID 83837
(208) 786-3032 Fax (208) 786-1209



# CHAIN OF CUSTODY RECORD

**Data to: svldata@TerraGraphics.com**
**Invoice to: Scott Peterson, DEQ**
**Project Name: Basin Yards**
**Project Code: BASYD**

**TO:SVL**

Normal / 2 Day / 5 Day / 10 Day T.A.T.

| Lab ID | Sample Date | SAMPLE DESCRIPTION | | | | Analysis | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water | Soil | Dust | Other | Pb | As | | | | | |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |
| | / / | | x | | | x | x | | | | | Dry and Sieve to -80 Mesh |

| Relinquished By: (Signature) | Date/Time | Received By: (Signature) | Relinquished By: (Signature) | Date/Time | Received By: (Signature) |
|---|---|---|---|---|---|
| Relinquished By: (Signature) | Date/Time | Received By: (Signature) | Date/Time | Remarks | |

TerraGraphics
Environmental Engineering, Inc.

108 W. Idaho
Kellogg, ID 83837
(208) 786-3032 Fax (208) 786-1209



# CHAIN OF CUSTODY RECORD

| Data to: svldata@TerraGraphics.com | Project Name: Basin Drinking Water | | | | | Analysis | | | | | | | Normal T.A.T. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Invoice to: Scott Peterson, DEQ | Project Code: BASDW | | | | | | | | | | | | |
| TO:SVL | SAMPLE DESCRIPTION | | | | | | | | | | | | |
| Lab ID | Sample Date | Water | Soil | Dust | Other | Pb | As | Cd | | | | | REMARKS |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |
| | / / | x | | | | x | x | x | | | | | Drinking Water |

| Relinquished By: (Signature) | Date/Time | Received By: (Signature) | Relinquished By: (Signature) | Date/Time | Received By: (Signature) |
|---|---|---|---|---|---|
| | | | | | |

| Relinquished By: (Signature) | Date/Time | Received By: (Signature) | Date/Time | Remarks |
|---|---|---|---|---|
| | | | | |

# USEPA Contract Laboratory Program
# Inorganic Traffic Report & Chain of Custody Record

**Case No:** 37438
**DAS No:**
**R**

| | | | | | |
|---|---|---|---|---|---|
| **Region:** | 10 | **Date Shipped:** | 5/29/2008 | **Chain of Custody Record** | **Sampler Signature:** |
| **Project Code:** | TEC-894B | **Carrier Name:** | Hand Delivered | **Relinquished By (Date / Time)** | **Received By (Date / Time)** |
| **Account Code:** | 08T10P302DD2C102QLA00 | **Airbill:** | | 1 | |
| **CERCLIS ID:** | IDD048340921 | **Shipped to:** | SVL Analytical, Inc.<br>One Government Gulch<br>Kellogg ID 83837<br>(208) 784-1258 | 2 | |
| **Spill ID:** | 2Q | | | 3 | |
| **Site Name/State:** | May 2008 Quick TA Basin Soil Sampling/ID | | | 4 | |
| **Project Leader:** | Lisa Hall | | | | |
| **Action:** | Remedial Action | | | | |
| **Sampling Co:** | TerraGraphics Environmental Engineering | | | | |

| INORGANIC SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No./ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | ORGANIC SAMPLE No. | QC Type |
|---|---|---|---|---|---|---|---|---|
| MJ8N36 | Soil (0-12)/ Richardson Raymond | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00880 | S: 5/6/2008 11:11 | | -- |
| MJ8N37 | Soil (0-12)/ Richardson Raymond | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00881 | S: 5/6/2008 11:11 | | -- |
| MJ8N38 | Soil (0-12)/ Richardson Raymond | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00882 | S: 5/6/2008 11:11 | | -- |
| MJ8N39 | Soil (>12)/ Richardson Raymond | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00883 | S: 5/6/2008 11:11 | | -- |
| MJ8N40 | Soil (>12)/ Lari Becky | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00884 | S: 5/12/2008 12:30 | | Field Duplicate |
| MJ8N41 | Soil (0-12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00885 | S: 5/6/2008 8:55 | | -- |
| MJ8N42 | Soil (0-12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00886 | S: 5/6/2008 8:55 | | Lab QC |
| MJ8N43 | Soil (0-12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00887 | S: 5/6/2008 8:55 | | Field Duplicate |
| MJ8N44 | Soil (0-12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00888 | S: 5/6/2008 8:55 | | -- |
| MJ8N45 | Soil (>12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00889 | S: 5/6/2008 8:55 | | -- |

| | | | |
|---|---|---|---|
| **Shipment for Case Complete? N** | **Sample(s) to be used for laboratory QC:** MJ8N42, MJ8N63 | **Additional Sampler Signature(s):** | **Chain of Custody Seal Number:** |
| **Analysis Key:** MA 1341.2 = As, Pb 6 Day | **Concentration:** L = Low, M = Low/Medium, H = High | **Type/Designate:** Composite = C, Grab = G | **Shipment Iced?** _____ |

**TR Number:** 10-482730740-052708-0001

REGION COPY

**PR provides preliminary results. Requests for preliminary results will increase analytical costs.**

Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

# USEPA Contract Laboratory Program
# Inorganic Traffic Report & Chain of Custody Record

Case No: 37438
DAS No:
SDG No:
L

| | |
|---|---|
| Date Shipped: | 5/29/2008 |
| Carrier Name: | Hand Delivered |
| Airbill: | |
| Shipped to: | SVL Analytical, Inc.<br>One Government Gulch<br>Kellogg ID 83837<br>(208) 784-1258 |

**Chain of Custody Record**

| Relinquished By | (Date / Time) | Received By | (Date / Time) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

Sampler Signature:

**For Lab Use Only**

Lab Contract No:
Unit Price:
Transfer To:
Lab Contract No:
Unit Price:

| INORGANIC SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No./ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | | ORGANIC SAMPLE No. | FOR LAB USE ONLY Sample Condition On Receipt |
|---|---|---|---|---|---|---|---|---|---|
| MJ8N36 | Soil (0-12)/ Richardson Raymond | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00880 | S: 5/6/2008 | 11:11 | | |
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| MJ8N42 | Soil (0-12)/ Ritter Emily | M/C | MA 1341.2 (6) | (HNO3) (1) | 08S00886 | S: 5/6/2008 | 8:55 | | |
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| Shipment for Case Complete?N | Sample(s) to be used for laboratory QC: | Additional Sampler Signature(s): | Cooler Temperature Upon Receipt: | Chain of Custody Seal Number: | |
|---|---|---|---|---|---|
| | MJ8N42, MJ8N63 | | | | |
| Analysis Key: | Concentration: L = Low, M = Low/Medium, H = High | Type/Designate: Composite = C, Grab = G | | Custody Seal Intact? ___ | Shipment Iced? ___ |

MA 1341.2 = As, Pb 6 Day

**TR Number: 10-482730740-052708-0001**

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax

# INFORMED PARTICIPANT CONSENT

PROJECT TITLE: Coeur d'Alene Basin House Dust Sampling House ID#:

House Address (location):_____

Mailing Address:_____

Phone:_____ GIS ID #:_____

Parcel ID:_____

You are being asked to participate in a survey conducted by TerraGraphics Environmental Engineering, Inc. on behalf of the Idaho Department of Environmental Quality. The purpose of the survey is to determine levels of lead and arsenic in house dust within the Bunker Hill Superfund Site. You must give your signed agreement to participate in this survey. Participation in this survey is entirely voluntary and is being done at no cost to you.

Participation in the survey consists of two parts:

1) Dust Sampling: Vacuum dust and mat dust samples will be collected from your home and analyzed for lead and arsenic levels. Your results will be mailed to you.

2) An Interview: Questions will be asked to obtain information about your possible exposure pathways for lead. This interview will be completed when mats are picked up.

Environmental data will be available during public disclosure. Any published data from this survey will not identify specific individuals and will only give group information.

**PARTICIPANT CONSENT:** I understand why this survey is being done and why I am being asked to participate. I voluntarily agree to this survey and consent to participation. I understand that I can stop participation at any time. I understand that I may decline to answer any specific question and that I may withdraw from the survey at any time, without penalty. I understand that the investigators are not obligated to treat, or further evaluate any problems that may be found. If I have any further questions, I can contact Jerry Cobb (Panhandle Health District) at 783-0707 or Scott Peterson (DEQ) at 783-5781.

Participant Name (print):_____

Participant Signature:_____

Interviewer Signature_____

Date:_____

Owner: Y N

# Disclosure Laws

We want to inform you that Idaho law requires the following disclosure by the sellers/owners of residential property and real estate brokers and salespersons regarding the condition of the property.

- Idaho Code Sections 55-2501-2518, the “Idaho Property Disclosure Act,” requires seller/owners of residential real property to disclose the known presence of hazardous materials or substances to prospective buyers.

- Idaho Code Sections 54-2086 and 2087 of the “Idaho Real Estate License Law” requires real estate brokers and salespersons to disclose all adverse material facts actually known or which reasonably should have been known about the real estate to buyer/seller customers and clients.

There are also federal regulations in Section 1018 of Title X requiring disclosure of known information on lead-based paint, dust, and soil. The presence of lead and other metals in soils found throughout the Silver Valley/Coeur d’Alene Basin are considered hazardous materials or adverse material facts and can require disclosure.

# INSTRUCTIONS FOR DUST MATS

This mat will be used to collect dust tracked into your home through your daily activities. We will place the mat at the most heavily used entrance and retrieve it after 25-30 days. We will vacuum the mat and analyze the collected dust for lead and arsenic. The sample results will be reported to you at no charge.

Please follow these rules:

1. Do not vacuum, clean, or shake the mat.

2. Do not move the mat for any length of time. We document the location where the mat is placed in your home for our records. If the area under the mat needs to be cleaned, carefully set the mat to the side while cleaning takes place, and then return the mat to its original location.

3. Do not allow children to play directly on the mat.

4. Do not use the mat to wipe your feet. Continue to use the method you currently use for entering the home. For instance, if you currently wipe your feet on an exterior mat before entering the house, then continue to do so.

If you do not follow these rules, the sample results may not accurately reflect lead and arsenic concentrations in your home. If you have any questions about the mats, or are going to be away for an extended period of time, please feel free to call TerraGraphics at 786-1206. We thank you in advance for your participation and cooperation.

# Site Description Form

House Dust Mat Location

Name _____ Phone _____

Address _____ City _____

GISID# _____ Geoarea _____

Field ID # _____ Placement Date_____ Sampler's Initials _____

Vacuum Dust Collected? Yes_____ No_____ Pickup Date _____ Sampler's Initials _____

If mat is not retrieved at all, describe reason:

If the mat is not retrieved from the location it was originally dropped, fill in the following:
*where found:*

*condition:*

Location of Mat: _____ Front Door _____ Back Door _____ Other

**House Id# _____ GISID: _____ Parcel #_____**

2011 Household Questionnaire

**[Interviewer: Pick the mat up first! Then complete this questionnaire on all households in which a mat is picked up.** ***Let the participant know that it may take a few minutes to complete this questionnaire.*****]**

**Mat Retrieved? _____ Date _____ Vacuum Bag?_____**

| | | |
|---|---|---|
| **House ID #:** **Date:** **Interviewer Initials:** | | |
| **Name:** | | |
| *** Street Address:** | | |
| *** Mailing Address:** | | |
| **Home Phone Number:** (208) | **Work Phone Number:** ( ) | **Cell Phone Number:** ( ) |

* Must have both street and mailing address. If mailing address is the same, write "same." Please include zip code.

1. Did you vacuum the mat?
   1) yes 2) no 9) don't know

2. How many times did you pick up or shake the mat?
   1) only once 2) 2-4 times 3) More than 4 times
   4) None 9) don't know

3. Did you move it from its original location to a new location?
   1) yes 2) no 9) don't know

4. Did the mat get wet?
   1) yes 2) no 9) don't know

5. Did the mat get physically damaged by animals or otherwise?
   1) yes 2) no 9) don't know

6. How many days did you go on vacation/ stay away from the house since the mat was placed?
   ____ days

7. How many people regularly live in the home?
   Adults _____ Children _____ Pregnant Women_____

**If children live in the home, go to Question 8. If not, go to Question 10.**

**House Id# _____ GISID: _____ Parcel #_____**

8. If children live at the home, what are their ages? [Circle appropriate unit (years or months) for each child's age.]
   Child 1 _____ years / months  Child 2 _____ years / months
   Child 3 _____ years / months  Child 4 _____ years / months

9. How many hours per day does the most active or oldest child spend outside?
   During the summer: _____ hours
   During the winter: _____ hours

10. How many dogs, cats, or other pets regularly go in and out of the house?
    1) 1 animal  2) 2 or more animals
    4) none  9) Don't know

**If pets are owned, go to Question 11. If not, go to Question 12.**

11. Since the mat was placed, did your pet(s) regularly use the door where the mat was located?
    1) yes  2) no  9) don't know

12. From the following choices, how often were the windows or doors left open in the past month?
    1) everyday  2) 2-3 times a week
    3) 2-3 times  4) never
    9) don't know

13. Do you have a forced air heating or cooling system in your home (i.e., air ducts)?
    1) yes  2) no  9) don't know

14. Do you use a woodstove in the household?
    1) yes  2) no

**If yes, go to Question 15. If no, go to Question 16.**

15. What do you use for fuel (e.g., logs, railroad ties, scrap wood, coal)?
    _____

16. How many rooms are in the home (count all *regularly accessed* rooms including bedrooms, bathrooms, kitchen, living rooms, family rooms and others)? _____

17. How many of those rooms are carpeted? _____

    [Based on Questions 16 and 17, what percentage of the total rooms are carpeted?]
    1) <50% of the rooms  2) ≥50% of the rooms

**House Id# _____ GISID: _____ Parcel #_____**

18. From the following choices, how old is the oldest carpet in your home?
1) less than 1 year old 2) 1-5 years old 3) 6-10 years old
4) older than 10 years 9) don't know

19. From the following choices, how often is the carpet usually vacuumed?
1) every day 2) once a week 3) once a month
4) once every few months 5) never

20. Are there throw rugs/entrance mats at the entrances to this home?
1) Yes 2) No

**If yes, go to Question 21. If no, go to Question 22.**

21. From the following choices, how often are they cleaned (i.e., vacuumed, swept, laundered)?
1) every day 2) once a week 3) once a month
4) once every few months 5) never 9) don't know

22. Do people generally remove their shoes before entering the home?
1) yes 2) no

23. What year was this home built? (oldest part) Year: _____
1) before 1960 2) 1960 - 1978 3) 1979 or later
9) don't know

24. Do you own or rent your home?
1) rent 2) own

25. How long have you lived in this home?
1) <1 year 2) 1-5 years 3) >5 years

26. Has any part of the home been remodeled?
1) yes 2) no 9) don't know

**If yes, go to Question 27. If no or don't know, go to Question 28.**

27. When did the work take place?
1) within the last year 2) one to two years ago
3) more than 2 years ago 9) don't know

28. Have you sanded or removed paint from any part of the interior of the house or furniture?
1) yes When?_____ 2) no 9) don't know

29. Have you sanded or removed paint from any part of the exterior of the house?
1) yes When?_____ 2) no 9) don't know

**House Id# _____ GISID: _____ Parcel #_____**

30. Does your home contain lead-based paints?
1) yes 2) no 9) don't know

31. Do you have an official report or letter confirming this?
1) yes 2) no 9) don't know

32. Do members of your family or your pets access a crawl space or other areas under your house or porch on a regular basis?
1) yes 2) no 9) don't know

33. Has any new dirt, gravel, or sand been added to your yard or other areas around the house, not associated with yard cleanup?
1) yes 2) no 9) don't know

34. Has any excavation, grading, or other construction work been done to the yard or area around the house, not associated with yard cleanup?
1) yes 2) no 9) don't know

35. Has the yard (or ground immediately surrounding this residence) or the inside of this home been flooded?
1) yes When?_____ 2) no 9) don't know

36. Is there a daycare run out of this home?
1) yes 2) no

**If yes, go to Question 37. If no, go to Question 39.**

37. How many children are on site each day?
1) 1-4 2) 5-8 3) 9-16
4) >16 9) don't know

38. For how many days each week?
1) 1-2 2) 3-5 3) 6-7
9) don't know

39. If children live in the home or visit regularly, describe the condition of children's play areas using the following condition codes. [Use 9 if not applicable.]
*(on next page)*

**House Id# _____ GISID: _____ Parcel #_____**

Condition codes:
1 = grassy, vegetated, no bare soil
2 = some bare soil, partly grassy
3 = moderate amount of bare soils, gravel, dust
4 = area is mostly or totally bare soil, garden, gravel, riverbed
9 = N/A

| **Location** | **Condition** |
|---|---|
| Yard | |
| Play area | |
| Day care | |
| Neighbors | |
| Vacant lot | |
| Hillsides | |
| Relatives | |
| Other | |

40. Do any members of the household smoke?
1) Yes 2) No

41. Do any members of the household (including you) do the following activities? [First check Yes, No, or Don't Know for each activity. Complete the remaining columns only for activities checked Yes. Be sure to circle the appropriate unit (# times or # days) for all activities checked Yes.]

| **Activity** | **No** | **Don't Know** | **Yes** | **# Times or Days in the Past Three Months** | **Location(s)** |
|---|---|---|---|---|---|
| Dirt biking/4-wheeling | | | | times / days | |
| Mountain biking | | | | times / days | |
| Mudding | | | | times / days | |
| Camping | | | | times / days | |
| Boating | | | | times / days | |
| Swimming | | | | times / days | |
| Hunting – upland game | | | | times / days | |
| Hunting – waterfowl | | | | times / days | |
| Fishing | | | | times / days | |
| Other | | | | times / days | |

[Total number of activities: _____] (from chart above).

**House Id# _____ GISID: _____ Parcel #_____**

42. Do any members of the household (including you) do any activities in the Coeur d'Alene river flood basin that put them in contact with soil, other than those just listed? If yes, what activities and where?

_____

43. In the last 3 months, has any member of this household (including you) been employed in the following jobs?

| Occupation | Yes | No | Don't Know |
|---|---|---|---|
| Milling or concentrating ore | 1 | 2 | 9 |
| Carpentry or remodeling work | 1 | 2 | 9 |
| Foundry work | 1 | 2 | 9 |
| Professional plumbing/plumber | 1 | 2 | 9 |
| Mining | 1 | 2 | 9 |
| Landscaping/excavation | 1 | 2 | 9 |
| Construction Work in the Silver Valley | 1 | 2 | 9 |

44. Within the last 3 months, has any member of this household (including you) done any of the following activities in this home more than once?

| Activity | Yes | No | Don't Know |
|---|---|---|---|
| Painted pictures with artist's paints | 1 | 2 | 9 |
| Worked with stained glass or made metal jewelry | 1 | 2 | 9 |
| Cast lead into fishing sinkers, bullets or anything else | 1 | 2 | 9 |
| Worked with soldering in electronics or plumbing | 1 | 2 | 9 |
| Worked in a vegetable or flower garden around the home | 1 | 2 | 9 |
| Made pottery | 1 | 2 | 9 |
| Made tole paintings | 1 | 2 | 9 |
| Painted cars or bicycles | 1 | 2 | 9 |
| Reloaded bullets | 1 | 2 | 9 |

**[The following blanks are to be filled out by the interviewer upon inspection of the home.]**

1. Condition of paint:
   Inside: 1) good condition 2) chipping, chalking, peeling or bite marks
   Outside: 1) good condition 2) chipping, chalking, peeling or bite marks

2. Rate the grass coverage in yard:
   1) mostly soil/dirt 2) half bare/half covered
   3) mostly grass

**House Id# _____ GISID: _____ Parcel #_____**

3. Rate the coverage in the drip line:
   1) mostly bare soil/dirt 2) half bare/half covered
   3) mostly vegetated (i.e. flowerbeds, grass)

4. Rate general household hygiene
   1) poor: a lot of noticeable dust/odor/dirt 2) good

# Appendix D – Laboratory Standard Operating Procedures

# PREPARATION AND SUBSAMPLING OF EARTH, ROCK, AND TISSUE SAMPLES



Reviewed by: Jim Hodge

Approved by: _____ Date: 03/10/10
Laboratory Director

Reviewed by: _____ Date: 02-25-2010
Quality Assurance Manager

SVL Analytical, Inc.

I have read and understood the SOP (SVL 2018 Version 4.0)

| Print Name | Signature | Date |
|---|---|---|
| Jim Hodge | Jim Hodge | 3-9-2010 |
| Heidi Barnes | Heidi Barnes | [illegible] |
| Eric Bouck | [signature] | 3-9-10 |
| Mx Stillwell | [signature] | 7-18-2010 |
| JEROME MEIER | [signature] | 9/29/10 |
| | | |
| | | |
| | | |
| | | |

## Table of Contents

## 1.0 SCOPE AND APPLICATION

**1.1** This SOP describes sample preparation of earth and rock material (and discusses plant and animal tissue) prior to analyses.

**1.2** The application of the SOP must be conducted under explicit documented instructions from the client. NO WORK IS TO PROCEED WITHOUT THESE INSTRUCTIONS. The client must specify the exact details of sample preparation to be followed. If the client does not specify the preparation, have Client Services contact the client to clarify the requirements. If client does not know what preparation they want, let Client Services determine what the client is expecting from the analytical results and adapt a preparation scheme, documented in writing, to satisfy those expectations. The documented preparation scheme should be approved by the client in writing.

**1.3** Assume client samples are representative as received. In order to preserve representivity, ALL SAMPLES MUST BE HOMOGENIZED PRIOR TO ANY PREPARATION WORK. This will ensure that any segregation occurring during shipping is eliminated. The only cases where this will not apply are when the entire sample is to be prepared in one step (for example sieving an entire sample) or when the client specifically requests that the sample not be homogenized. Homogenization can be accomplished by redundant splitting, mixing in a bowl, or rolling (see Section 10.7.8). After homogenizing, then, and only then, can other preparation steps be initiated such as, splitting, drying, sieving, crushing, archiving, etc. Save all sample rejects unless authorized by the client otherwise.

**1.4** Record all homogenizing, subsampling, and preparation on a Sample Preparation Worksheet.

## 2.0 SUMMARY OF METHOD

**2.1** This SOP describes the preparation of the samples prior to a digestion or other bench preparation. Other SOPs describe sample digestions and/or preparations.

**2.2** The equipment utilized for earth and rock samples may include crushers, pulverizers, sieves, riffle splitters and drying ovens. Specialized equipment for plant and animal tissue samples includes blenders, drying ovens and Wiley mill.

## 3.0 INTERFERENCES

**3.1** During the preparation of samples, the primary interference concern is the introduction of contaminants into the sample. Cleanliness of equipment and work area will reduce the likelihood of the introduction of contaminants.

## 4.0 SAFETY

**4.1** Inhalation Protection

Since samples usually consist of earth or rock that must be dry to prepare the sample, dust is a primary safety concern. If the lungs are not protected, silicosis is a potential health issue. Other respiratory problems may develop as well. Therefore wear dust masks during the preparation of samples, when the material is dry, or when working in the preparation area when other lab personnel are working with dry samples. In addition, use the baghouses to provide downdraft on the work tables to reduce the airborne dust.

**4.2** Hearing Protection

Some of the equipment used to prepare samples, such as the crushers and pulverizers, is quite noisy. Operation of the baghouses and fans adds to the noise level. Therefore, use hearing protection when operating any rotary preparation equipment and the baghouses.

**4.3** Eye Protection

Wear safety glasses or goggles when working in the sample preparation area to prevent dust and sample fragments from entering the eyes. Sample crushing equipment may cause material to become airborne or become projectile-like. Therefore, everyone entering the sample preparation area should wear glasses or goggles. Safety shields also may be used when crushers are being utilized, but glasses or goggles also should be worn.

**4.4** Personal Contamination

Wear lab coats to prevent the contamination of clothing when preparing samples. Remove lab coats when leaving the sample preparation area. Wear lab gloves (nitrile, latex, etc.) to prevent contamination of samples as well as to prevent exposure to potentially harmful materials. Wear

appropriate gloves when necessary to protect the hands from abrasion or from hot sample drying pans.

**4.5** Heat Stress

The sample preparation area contains drying ovens. Thus, at times the area may be warm. Use window fans, oven exhaust and other ventilation to reduce the heat load on the sample preparation technician. A drinking fountain is provided in the sample preparation area. During warm working conditions, take water and rest breaks to reduce the possibility of heat-related stress.

**4.6** Potential Burns

Drying ovens used to prepare samples may operate at temperatures of 100-200°C. The ovens, and the samples contained therein, may cause burns. Allow samples to cool in the ovens before removing them unless tongs and/or gloves are used to handle the sample pans.

**4.7** Mechanical Hazards

Because some of the equipment used to reduce the particle size of samples, such as jaw crushers, roll crushers and pulverizers, have the potential to cause crushing injury, technicians must be specifically trained prior to using the equipment. Be aware of the potential for loose clothing to become caught in the equipment. Do not perform service on the equipment unless the equipment is turned off, disconnected and locked out (see Chemical Hygiene Plan).

## 5.0 EQUIPMENT, INSTRUMENTATION AND MATERIALS

Equipment and materials are available for the preparation of earth and rock material, and plant and animal tissue.

**5.1 Drying ovens**.

There are two types of drying ovens available: electric and gas fired.

**Electric oven includes**:

Despatch Style 287A, 30"Wx18"Dx24"H (interior), adjustable temperature, nominal 105°C oven, located in the sample preparation room.

Manufacturer unknown, stainless steel cabinet, 32"Wx18"Dx24'H, adjustable temperature, nominal 105°C oven, located in the soil digestion lab.

**Gas fired ovens include**:

Four, manufacturer unknown, each 72"Wx36"Dx54"H, temperature adjustable (approximately 38-250°C). The temperature is set based on the type of material being dried and the analyses to be conducted.

Electric muffle furnace includes:

Thermodyne Model F-A1730-1, temperature adjustable, 100-1200° C.

## 5.2 Crushers

Two types of crushers are available: Jaw crushers and roll crushers.

**Jaw crushers include**:

Sturtevant Type 4-8, 7.5 HP, with 3 ½" x 10" opening.

Manufacturer Unknown, 7.5 HP with 4 ½" x 5" opening.

Morse Bros. Machinery, 3 HP, with 3 ½" x 5" opening.

**Roll crushers**:

Manufacturer Unknown, 2HP each roll, adjustable 11" diameter x 16" rolls, nominal ¼" opening.

Manufacturer Unknown, 3HP each roll, adjustable 11" dia. X 16" rolls, nominal 1/8" opening.

## 5.3 Pulverizers

Three ring and puck pulverizers are available, manufactured by TM Engineering. The pulverizers are capable of reducing rock samples to 200-mesh size.

### 5.4 Mortar and Pestle

Ceramic mortar and pestles are available for reducing soil aggregates prior to sieving.

### 5.5 Riffle Splitters

Riffle splitters are available for splitting samples. The following sizes are available:

½" opening, stainless steel (Sepor)
2" opening, steel
¾" opening, galvanized steel
5/8" opening, stainless steel (2 splitters)
½" opening, stainless steel
1/8" opening, stainless steel

Stainless steel catch pans are available for the stainless steel splitters.

### 5.6 Sieves

Sieves of various meshes are available for size separation of samples. A table is included at the end of this SOP which lists the sieves on hand (at the time of the preparation of the SOP). Other sizes are readily available from our suppliers. Brass and stainless steel sieves are available.

To assist in the sieving activity, a Rotap machine that is capable of holding six eight-inch sieves is available.

### 5.7 Mill

The laboratory has a Wiley mill available for the preparation of plant and animal tissue samples.

Thomas-Wiley Laboratory Mill, Model 4, Thomas Scientific.

### 5.8 Miscellaneous Equipment

The laboratory has other equipment that is utilized in the preparation of samples for analysis. This equipment includes stainless steel mixing bowls and spoons, blenders, drying pans, crucibles, balances, etc.

## 6.0 REAGENTS AND STANDARDS

No reagents or standards are used in sample preparation.

## 7.0 INSTRUMENT SETTINGS

**7.1** The openings in the jaw crushers are adjustable. The size of the crusher used depends on the size of the sample aggregates. The roll crushers are adjustable, but usually are left at 1/4" or 1/8". They are adjusted if the client provides a particular size reduction specification.

**7.2** The ovens for drying rock and soil material for analysis are normally set at 105°C. If samples require a faster drying time, set the oven to a higher temperature, but not so high that it "browns" the paper label used to identify the sample (approximately 120°C).

**7.3** Place samples that require air drying in a warm room (about 21°C) or in an oven with only the fan and pilot light on (about 30-35°C).

**7.4** Ovens are used for drying purposes only and are not regulated. If the samples are not dry enough for the process intended they are to be returned to the oven for further drying.

## 8.0 CALIBRATION

No calibrations are necessary.

## 9.0 SAMPLE HANDLING AND PRESERVATION

**9.1** Preservation and Storage

Samples may be received either cold or warm. Store samples in the same condition in which they were received, unless the client provides instructions otherwise. Store samples requiring cold storage between 0-6° C in either the soils cooler or the walk-in cooler. Store samples not requiring cold storage in the sample receiving room or the basement at room temperature. Review long-term storage requirements (for samples on hold) with the client. Do not store samples past holding times without notifying the client.

**9.2** Sample Handling

Do not handle samples directly with the hands. If the samples require handling outside of their container or another clean container, clean gloves will be worn to prevent contamination of the samples. All equipment used to prepare samples will be cleaned between samples to prevent contamination.

**9.3** Equipment Cleaning

**9.3.1** Use soap and water to clean sample pans that have been used to dry samples, rinsing them thoroughly after washing.

**9.3.2** Clean crushers with compressed air. After crushing each sample, clean the rolls of the roll crushers with a steel brush and then with compressed air.

**9.3.3** Clean pulverizers with compressed air. If any sample, however, adheres to the pulverizer clean it with sand by placing clean sand in the pulverizer and operating it for 10-15 seconds. After dumping out the sand, clean the pulverizer with compressed air.

**9.3.4** Clean sieves with compressed air, if the sample was dry when sieved. If the sample was wet, or if material adheres to the sieve, wash and dry the sieve before reusing it.

**9.3.5** Only use the mortar and pestle with dry samples. Clean them with compressed air between samples. If material adheres to the mortar or pestle, remove it with a paper towel. If necessary, wash and dry the mortar and pestle after use.

**9.3.6** Clean blenders used for tissue samples with soap and water. Rinse them with lab water between samples. Wash, rinse, and dry them after use.

## 10.0 SAMPLE PREPARATION AND SUBSAMPLING

### 10.1 General Instructions

**10.1.1** Conduct sample preparation in accordance with the requirements of the client and this SOP. If the client has not specified preparation instructions, follow Section 1.2.

**10.1.2** The method of preparation also is dependent on the type of subsampling required, which in turn is dependent on the sample aliquot required for analysis. See Section 10.7 for subsampling requirements and procedures.

**10.1.3** Before beginning any preparation, find out which analyses are to be performed.

**10.1.3.1** If volatile analyses are to be performed in addition to non-volatile analysis, the sample will require special handling techniques. For purposes of this SOP, assume that all analyses are for non-volatile analysis.

**10.1.3.2** If analysis for mercury is required, do not heat the sample or subject it to size reduction that would generate significant heat.

**10.1.4** If the largest sample particles are smaller than the maximum size allowed for the analytical procedure, no size reduction is necessary. The table given in Section 10.7 below provides some guidance in this regard.

### 10.2 Rock Samples

**10.2.1** Determine if the sample is to be analyzed "as received" or to be dried prior to analysis. If the sample is to be dried, find out whether oven drying or air drying is appropriate.

**10.2.2** If the sample is to be oven dried, dry it at approximately 105°C. Drying overnight is usually sufficient. Place a sample label in the drying pan.

**10.2.3** If mercury analysis is to be performed, do not oven dry the portion of the sample for the mercury analysis. Some clients request air drying for their samples. NOTE: HOMOGENIZE THE SAMPLE BEFORE SPLITTING OR TAKING AN ALIQUOT FOR Hg; follow

Sections 1.3 and 10.7.8.

**10.2.4** Crush rock samples, or samples containing large rocks that will be included in the analysis, in the jaw crusher and/or roll crusher to a maximum size of approximately 1/8".

**10.2.5** If the sample weighs more than about one-half kilogram, split it with a riffle splitter to about 300 g. Retain the rejects until released by the client or for 30 days following completion of the job, whichever comes first, unless the client has indicated that they can be disposed.

**10.2.6** Pulverize approximately 200-300 g to a nominal 100-mesh size for analysis.

**10.2.7** Place the pulverized sample in a paper envelope. Place a sample identification tag (bag label and/or bar code) on the outside of the envelope.

**10.3** Gravel Samples

**10.3.1** Determine if the sample is to be analyzed "as received" or to be dried prior to analysis. If the sample is to be dried, find out whether oven drying or air-drying is appropriate.

**10.3.2** If the sample is to be oven dried, dry it at approximately 105°C. Drying overnight is usually sufficient. Place a sample label in the drying pan.

**10.3.3** If mercury analysis is to be performed, do not oven dry the portion of the sample for the mercury analysis. Some clients may request air NOTE: HOMOGENIZE THE SAMPLE BEFORE SPLITTING OR TAKING AN ALIQUOT FOR Hg: follow Sections 1.3 and 10.7.8. drying for their samples.

**10.3.4** Crush the sample in the jaw crusher and/or roll crusher to at least a 1/8" maximum size prior to further preparation.

**10.3.5** If analysis for metals is required, pulverize the sample to reduce the gravel to a particle size appropriate for metals digestion.

**10.4** Soil and Sediment Samples

**10.4.1** Determine if the client wants to have large particles such as gravel, roots, glass, nails, and other materials removed. NOTE: if artifacts are to be removed, ensure that sample homogenization occurs first, split the sample, and archive one split for future reference if so required. If so, use an 80-mesh screen for this purpose, unless the client specified otherwise. Notify the client that the sample results may be biased high if the sample is screened and the larger particles discarded.

**10.4.2** Determine if the sample is to be analyzed "as received" or to be dried prior to analysis. If the sample is to be dried, find out whether oven drying or air-drying is appropriate.

**10.4.3** If the sample is to be oven dried, dry it at approximately 105°C. Drying overnight is usually sufficient. Place a sample label in the drying pan.

**10.4.4** If mercury analysis is to be performed, do not oven dry the portion of the sample for the mercury analysis. Some clients request air drying for their samples. NOTE: HOMOGENIZE THE SAMPLE BEFORE SPLITTING OR TAKING AN Aliquot FOR Hg; follow Sections 1.3 and 10.7.8.

**10.4.5** If the client has specified that they want percent solids or percent moisture homogenize the sample then send it to the Soil Digestion Lab. The technician will do the required test by SVL SOP 4022.

**10.4.6** If the client requests sieve analysis, air dry or oven dry the sample prior to sieving. The client should specify how the sample is to be dried. Place a sample identification label in the drying pan with the sample.

**10.4.6.1** If a client requests sieve analysis with a mesh size smaller than 10-mesh, air dry the samples before sieving. Smaller sieve openings will clog with moist samples. There may be exceptions, such as with some sediment samples that consist mostly of muddy water.

**10.4.6.2** Ask the Sample Receiving Supervisor or the Classical Chemistry Department Supervisor whether rejects from sieving must be retained. If they are to be retained,

supply appropriate sample labels and/or bar code labels.

**10.5** Plant Tissue

**10.5.1** Arrange plant tissue samples loosely in a pan. Place them in a drying oven with the fan and pilot light on. Or cover the pan and leave it in a warm room. Place a sample label in the pan.

**10.5.2** Some types of vegetation have cellular water that requires several days of drying to remove, so check the plant material about every 12 hours to determine if it is dry.

**10.5.3** Following the drying process grind the sample in the Wiley mill.

**10.5.4** The client must specify the portions of the sample to be analyzed (e.g. leaves but not stems or branches) and if any portion of the "rejects" need to be retained.

**10.5.5** Place the prepared sample in a paper envelope, plastic bag or jar and attach the appropriate label and/or bar code label.

**10.6** Animal Tissue

**10.6.1** Animal tissue analysis requires special handling and preparation techniques. Ask the client to provide specific instructions as to the preparation. If the client cannot specify the specific preparation, the preparation should be discussed with the client on a case-by-case basis to determine the procedure and documented.

**10.6.2** In most cases, grind the sample in the blender while it is moist, and then dry it prior to analysis.

**10.7** Subsampling

**10.7.1** Homogenize the entire sample before initiating any subsampling activities; follow Section 1.3, ASTM D 6323 and 10.7.8.

**10.7.2** Sub-sampling is the collection of an aliquot from a sample. Refer to ASTM D 6323 for a detailed discussion of sub-sampling procedures.

**10.7.3** Use caution and apply appropriate methodology to obtain a

representative aliquot so that the analytical results are not biased. In general, the larger the particles in the sample, the larger the sub-sample should be in order to prevent bias.

**10.7.4** If the particles are larger than would be allowed in the digestion or analytical procedure, crush, pulverize, or grind the sample as described above prior to sub-sampling.

**10.7.5** Determine the sub-sampling activity and the size of the sub-sample by considering the amount of sample needed for analysis and the type of analysis to be conducted. The ASTM standard discusses these requirements. A table from the document is provided below.

**10.7.6** Ask a supervisor familiar with the SOP and method requirements to assist in making the decision about the subsampling procedure. Give consideration to the nature of the contaminant (or parameter) to be measured. Try to determine if the contaminant is present on a molecular scale or on a macro scale. If the contamination is only expected to be on the finer particles, be aware that exclusion of the larger particles would bias the results high. If the large particles are removed from the sample or subsample, the mass of both the large and small particles may be needed to determine the concentration of the contaminant in the "as received" sample. Non-homogeneous samples will require some thought to make sure the matrix that is to be analyzed is appropriately represented in the aliquot.

**10.7.7** Recommended minimum Sub-sample Mass for Particulate Materials to Achieve a Fundamental Error of 15% (From ASTM D 6323, 2003)

| Recommended Minimum Subsample Mass, g | Maximum Allowable Particle Size, cm | Size Class | U.S. Standard Sieve Mesh Size |
|---|---|---|---|
| 0.1 | 0.05 | Clay to coarse sand | 35 |
| 1 | 0.1 | Coarse to very coarse sand | 18 |
| 2 | 0.13 | Very coarse sand | 13 |
| 5 | 0.17 | Very coarse sand | 12 |
| 10 | 0.21 | Granule gravel | 10 |
| 30 | 0.31 | Granule gravel | 7 |

| Recommended Minimum Subsample Mass, g | Maximum Allowable Particle Size, cm | Size Class | U.S. Standard Sieve Mesh Size |
|---|---|---|---|
| 50 | 0.37 | Granule gravel | 6 |
| 100 | 0.46 | Pebble gravel | 5 |

**10.7.8** Prior to subsampling, homogenize the sample by thoroughly mixing (review Section 1.3).

**10.7.8.1** Samples can be mixed by a riffle splitter, rolling and coning, in a bowl with a spoon, on a clean surface with a trowel (folding the sample), placing in a closed container and shaking/rolling, and a number of other ways. The method used depends on the sample.

**10.7.8.2** If the sample consists of small particles and is being subsampled by riffle splitting, pre-mixing probably is not required.

**10.7.8.3** If the sample is being subsampled by removing portions of the sample, such as with a scoop from a pile, thoroughly mix the sample prior to subsampling. Mixing can be achieved by running the sample through a riffle splitter several times and recombining the splits each time.

**10.7.8.4** Samples with different size particles, such as soil with larger rocks or soil with lead shot present, may tend to segregate if mixed with a spoon in a large bowl or by rolling or shaking in a closed container, it bears repeating pick an appropriate homogenization technique.

**10.7.8.5** Some samples will require crushing prior to sub-sampling. For example, if a sample with large rocks is to be sub-sampled, and the large rocks are to be included in the sample, the sample will require size reduction. After size reduction, thoroughly mix the sample prior to sub-sampling if a riffle splitter is not utilized. Even if a riffle splitter is utilized, it is prudent to recombine any discrete portions of the sample before

riffle splitting.

**10.7.8.6** If a sample is to be sieved, the sample generally will require mixing prior to sieving (unless the whole sample is to be sieved).

**10.7.9** If necessary, perform volume reduction and/or particle size reduction on homogenized sample. Some samples require particle size reduction prior to subsampling; other samples only require volume reduction.

**10.7.9.1** In general, perform particle size reduction before volume reduction, unless the client has specified that large particles are to be removed and not analyzed. If volume reduction occurs before size reduction, retain and archive a homogenized split of the original sample for future work.

**10.7.9.2** Analysis typically requires about 200 to 300 g of prepared sample material. If the sample is larger than this, reduce the volume by riffle splitting or some other means such as transversal subsampling, cone and quartering, or alternate scoop. These procedures are described in ASTM D 6323 (2003). At SVL, riffle splitting is normally used, although alternate scoop may also be utilized on occasion.

**10.7.9.3** Volume reduction by riffle splitting divides a sample into two equal parts. Pour the sample through the splitter and collect the split sample in two pans. If the first split is too large for analytical work, pour one of the two pans through the splitter again. Repeat this procedure until one of the pans contains about 200 to 300 g of sample.

**10.7.9.4** Clean the splitter with compressed air if the samples are dry, and by washing and drying if the samples are moist.

**10.7.9.5** After splitting, return the "rejected" portion of the sample to the original container. Place the subsample to be used for analysis in a clean container and label it.

## 11.0 DATA REDUCTION

**11.1** There is usually no data reduction associated with sample preparation.

## 12.0 DATA AND RECORDS MANAGEMENT

**12.1** Document the sample preparation activities on a Sample Preparation Worksheet. Scan the Sample Preparation Worksheet and attach to the Work Order.

## 13.0 QUALITY CONTROL

**13.1** The quality control activities associated with sample preparation include, assuring sample homogeneity, assuring that the samples do not become contaminated during handling and preparation, assuring that oven temperatures are appropriate for the material being dried and the analyses to be performed, and assuring that the materials are subjected to the procedures as described by the client.

## 14.0 REFERENCES

**14.1** ASTM D 6323-98. 2003. Standard Guide for Laboratory Subsampling of Media Related to Waste Management Activities. ASTM International. 11 pages.

**14.2** USACE EM 200-1-3. 2001. Appendix E: Sample Manipulation Instructions. 30 p.

## 15.0 POLLUTION PREVENTION

**15.1** Airborne particulates are the main concern with these procedures, use of a controlled environment helps to reduce these emissions.

## 16.0 WASTE MANAGEMENT

**16.1** The proper segregation of sorted material and the re-packaging of parent and daughter products, coupled with good laboratory practices will reduce the waste associated with these procedures.

## 17.0 CHANGE HISTORY

| Date | Revision | Changes |
|---|---|---|
| 01/25/07 | 3.0 | 7.1 Removed the word "not" in the opening sentence. Added sections 15.0 POLLUTION PREVENTION, 16.0 WASTE MANAGEMENT and 17.0 CHANGE HISTORY. |
| 01/30/08 | 3.0 | Removed 10.4.6 |
| 02/09/09 | 4.0 | Changed or added 1.2, 1.3 and 1.4. 1.2 removed If the client does not want to discuss the preparation, or if the client cannot be contacted in a timely manner, use best judgment to determine the sample preparation and subsampling techniques". Added 7.4. Removed section 8.1. Removed 10.1.2 "If the client cannot specify a preparation requirement, try to find out how the data will be used in order to determine the sample preparation and subsampling methods. Use best judgment to prepare the sample to provide the client with the data they desire and to meet the requirements of the method". Removed 10.1.3 "If the client specified the preparation method, use the benchsheet to note that the sample was prepared in accordance with client instructions. If the client did not specify the preparation method, record the method used on the Sample Preparation Worksheet". Added 10.2.3, 10.3.3 and 10.4.4 "NOTE: HOMOGENIZE THE SAMPLE BEFORE SPLITTING OR TAKING AN ALIQUAT FOR Hg; follow Sections 1.3 and 10.7.8". 10.4.1 "NOTE: if artifacts are to be removed, ensure that sample homogenization occurs first, split the sample, and archive one split for future reference if so required". 10.4.5 added "homogenize the sample then send it to the Soil Digestion Lab. The technician will do the required test by SVL SOP 4022.<br>". 10.7.1 added "Homogenize the entire sample before initiating any subsampling activities; follow Section 1.3 and ASTM D 6323 follow sections 1.3 and 10.7.8". 10.7.4 Removed "If the client has not specified the procedures, discuss the sub-sampling process with the client to ensure that the technique will fit the intended use of the data". 10.7.5 Removed "If the client has not specified the procedures, record the process used on the Sample Preparation Worksheet and/or on a document (e.g., narrative) to be filed with the report". 10.7.8 Changed to "Prior to subsampling, homogenize the sample by thoroughly mixing (follow Section 1.3). 10.7.8.6 Changed to "unless the entire sample is to be sieved". 12.1 |

| | | |
|---|---|---|
| | | changed to "Scan the Sample Preparation Worksheet and attach to the Work Order". 13.1 added "assuring sample homogeneity" and "and the analyses to be performed". Removed "or determined by the laboratory".<br><br>These changes came about due to customer complaints and the need for clarity. |
| 02/25/10 | 4.0 | No changes. |

# Available Sieves

## A) 8-inch diameter Sieves

### A1) Brass/Stainless Steel Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 140 | .0041 |
| 1 | 40 | .0165 |
| 1 | 8 | .0937 |
| 2 | 4 | .187 |
| 1 | 3/8 | .375 |
| 1 | ¾ | .875 |
| 1 | 1 | 1.00 |
| 2 | 1 ½ | 1.50 |

### A2) Brass/Brass Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 400 | .0015 |
| 2 | 325 | .0017 |
| 4 | 230 | .0025 |
| 10 | 170 | .0035 |
| 1 | 140 | .0041 |
| 11 | 100 | .0059 |
| 6 | 80 | .0070 |
| 2 | 70 | .0083 |

| | | |
|---|---|---|
| 22 | 60 | .0098 |
| 3 | 50 | .0116 |
| 1 | 50 | .0117 |
| 1 | 45 | .0138 |
| 1 | 40 | .0164 |
| 1 | 20 | .0328 |
| 1 | 6 | .164 |
| 1 | 5/16 | .375 |
| 2 | ½ | .50 |
| 1 | ½ | .526 |
| 1 | ¾ | .750 |

A3) Stainless Steel Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 400 | .0015 |
| 1 | 325 | .0017 |
| 1 | 230 | .0024 |
| 3 | 230 | .0025 |
| 5 | 200 | .0029 |
| 3 | 140 | .0041 |
| 1 | 120 | .0049 |
| 2 | 100 | .0059 |
| 27 (several repaired) | 80 | .0070 |
| 2 | 70 | .0083 |

| | | |
|---|---|---|
| 2 | 60 | .0097-0.0098 |
| 1 | 50 | .0118 |
| 1 | 45 | .0138 |
| 1 | 40 | .0165 |
| 1 | 35 | .0197 |
| 1 | 30 | .0234 |
| 1 | 30 | .0236 |
| 1 | 20 | .0331 |
| 2 | 18 | .0394 |
| 1 | 16 | .0465 |
| 1 | 14 | .0561 |
| 2 | 10 | .0787 |
| 1 | 8 | .0925 |
| 1 | 5 | .1570 |
| 1 | 4 | .1870 |
| 2 | ¼ | .250 |
| 1 | 3/8 | .375 |
| 1 | ¾ | .750 |
| 1 | 1 ½ | 1.5 |
| 2 | 3 | 3.0 |

B) 12-inch diameter Sieves

B1) Stainless Steel Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 230 | .0025 |
| 7 | 80 | .0070 |
| 2 | 60 | .0098 |
| 3 | 10 | .0787 |

C) 18-inch diameter Sieves

C1) Brass/Stainless Steel Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 200 | .0029 |

D) 3-inch diameter Sieves

D1) Stainless Steel Sieves

| Quantity | Sieve Number | Sieve Opening |
|---|---|---|
| 1 | 80 | .0070 |

## SAMPLE PREPARATION WORKSHEET

Job# _____

Client_____

Date_____ Initials_____

Sample Matrix: Rock_____ Soil_____ Drill Core_____

Vegetation _____Other (describe) _____

Drying: Air_____ Oven_____ None_____

Riffle Splitting: Yes_____ No_____

Sieving: Yes_____ Mesh_____ None_____

Crushing: Yes_____ Jaw_____ Roll_____

Mortar and Pestle_____ None_____

Pulverizing: Yes_____ No_____

Wiley Mill: Yes_____ No_____

Rejects: Retained_____ Disposed_____ Returned_____

Special Preparation:

_____

_____

_____

_____

_____

_____

# Appendix E – Sample Result Letters

Date

«First_Name» «Last_Name»
«Mailing_Address»
«Mailing_Town», «State» «Zip»

Re: «Street_Address», «Town» (Parcel: «Parcel_Number»)

Dear «First_Name» «Last_Name»:

The soil at your property was tested to determine the levels of lead and arsenic present. The State of Idaho's Department of Environmental Quality (DEQ) conducted this testing as part of the Basin Environmental Improvement Project Commission's 2011 residential soil sampling effort. Sampling may have included maintained yards, gravel driveways, parking areas, gardens, play areas, rights-of-way, and vacuum bags. If you use a private well, water samples may also have been collected. Results are summarized in the enclosed table. You can use the enclosed map to see the general locations of areas that were sampled. Lead and arsenic concentrations are reported as milligrams per kilogram (mg/kg) of dust or soil. Although other metals may be reported by the laboratory, remedial action conclusions are based solely on concentrations of lead and arsenic. The "Conclusions" for each sample location indicate the following:

1. Removal – Your address has been added to the list of properties eligible for remedial action, and you will be contacted at a later date to discuss the next steps of the remediation process. If a concentration in the top 12 inches of your soil is greater than or equal to 1,000 mg/kg lead or 100 mg/kg arsenic, then remediation may include partial soil removal and replacement with clean soil.

2. Greening - Your address has been added to the list of homes eligible for remedial action, and you will be contacted at a later date to discuss the next steps of the remediation process. If the lead concentration in the top 6 inches of your soil is between 700 mg/kg and 999 mg/kg, then remedial action may include the addition of a barrier (soil, mulch, or grass).

3. To be Resampled – Some locations and depths should be resampled to determine the depth of removal or to confirm whether or not removal or greening is necessary. If a concentration in the top 12 inches of soil is between 900 mg/kg and 999 mg/kg lead or between 60 mg/kg and 99 mg/kg arsenic, you will be contacted in the near future so a resample may be collected.

4. No Action – No further action will be taken in these sample locations. If all sample locations have a conclusion of "No Action," you may be contacted at a later date to confirm that all areas of concern have been adequately sampled. If the lead concentration in the top 12 inches of your soil is less than 700 mg/kg and the arsenic concentration is below 60 mg/kg, then no further action need be taken.

If a resample has already been collected from your property for the reason listed in #3, the resample result may be in the enclosed table. If a resample was collected to confirm the removal depth in an area, no conclusion is given, since that area is already eligible for removal. If your resample results are not yet available, they will be provided to you at a later date.

A dust sample from your vacuum cleaner bag may have been collected. In this case, lead and arsenic levels are provided to you for informational purposes only. No interior remediation activities are anticipated as part of the Basin remedial plan at this time.

If water samples were collected from your private water source, the results are also listed in the enclosed table. If your water results are not yet available, they will be provided to you at a later date. The action levels for water are 0.01 milligrams per liter (mg/L) for arsenic, 0.005 mg/L for cadmium, and 0.015 mg/L for lead. If the initial water sample results are above these levels and the purged sample results are below these levels, your home's plumbing may contain lead pipes or solder, and no remediation activities are scheduled as part of the Basin remedial plan. To reduce your exposure, you should flush the cold-water pipes by running the water until it becomes as cold as it will get prior to consumption anytime the water in a particular faucet has not been used for six hours or longer. If your purged results are above the action levels, the water source that you use may be contaminated. You will be contacted by DEQ at a later date to discuss filtration systems or alternative drinking water sources.

We want to inform you that Idaho law requires the following disclosure by the sellers/owners of residential property and real estate brokers and salespersons regarding the condition of the property.

- Idaho Code Sections 55-2501-2518, the "Idaho Property Disclosure Act," requires seller/owners of residential real property to disclose the known presence of hazardous materials or substances to prospective buyers.
- Idaho Code Sections 54-2086 and 2087 of the "Idaho Real Estate License Law" requires real estate brokers and salespersons to disclose all adverse material facts actually known or which reasonably should have been known about the real estate to buyer/seller customers and clients.

There are also federal regulations in Section 1018 of Title X requiring disclosure of known information on lead-based paint, dust, and soil. The presence of lead and other metals in soils found throughout the Silver Valley/Coeur d'Alene Basin are considered hazardous materials or adverse material facts and can require disclosure.

Lead and arsenic pose potential health problems, especially for young children. You can reduce your exposure to contaminated dust and dirt by mopping, vacuuming, and changing vacuum cleaner bags and filters frequently. We recommend you take steps to reduce potential exposures and possible risks associated with elevated dust concentrations in your home. The enclosed brochure entitled "Clean Livin'," contains tips for reducing your exposure to lead.

If you have any questions or concerns about the yard program, please feel free to contact the DEQ Kellogg office at 208-783-5781. If you have questions or concerns about exposure to lead or arsenic please call Jerry Cobb at Panhandle Health District (208-783-0707).

Sincerely,

Scott M. Peterson
Coeur d'Alene Basin On-site Coordinator
Idaho Department of Environmental Quality

Cc: Jerry Cobb, PHD

# Sample Analysis Results

**ADDRESS CITY, ID, PARCEL NUMBER** | **Remediated:**

| SAMPLE LOCATION | SAMPLE DATE | ANALYTE | UNITS | SOIL | | | | | DUST QA | WATER QA | COMMENTS | CONCLUSION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0-1" QA | 1-6" QA | 6-12" QA | 12-18" QA | 18-24" QA | | | | |
| Flower Garden (FG1) | 10/11/2010 | ARSENIC | MG/KG | 5.6 J | 7.9 J | 8.1 J | 7.1 J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 158 | 270 | 161 | 128 | | | | | |
| Flower Garden (FG2) | 10/11/2010 | ARSENIC | MG/KG | 8.4 J | 8.7 J | 8.5 J | 7.3 J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 421 | 374 | 166 | 76.5 | | | | | |
| Garden (GD1) | 10/11/2010 | ARSENIC | MG/KG | 3.3 J | 2.1 J | 5.5 J | 10 J | 8 J | | | | REMOVAL |
| | 10/11/2010 | LEAD | MG/KG | 62.4 | 67.3 | 521 | 906 | 274 | | | | |
| Garden (GD2) | 10/11/2010 | ARSENIC | MG/KG | 6.3 J | 6.2 J | 7.7 J | 8 J | 7 J | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 65.1 | 97.8 | 125 J | 46.9 J | 21.6 J | | | | |
| Right of Way (RW1) | 10/11/2010 | ARSENIC | MG/KG | 12.5 | 10.5 | 7.4 J | 6.4 J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 429 | 314 | 73.2 | 36.5 J | | | | | |
| Right of Way (RW2) | 10/11/2010 | ARSENIC | MG/KG | 10 | 9.8 | 8.3 J | 7.5 J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 311 | 263 | 140 | 85.7 | | | | | |
| Right of Way (RW3) | 10/11/2010 | ARSENIC | MG/KG | 11.3 | 11.8 J | 11 J | 8.4 J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 362 | 473 | 463 | 119 | | | | | |

## Sample Analysis Results

**ADDRESS CITY, ID, PARCEL NUMBER** | **Remediated:**

| SAMPLE LOCATION | SAMPLE DATE | ANALYTE | UNITS | SOIL | | | | | | | | DUST QA | WATER QA | COMMENTS | CONCLUSION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0-1" | QA | 1-6" | QA | 6-12" | QA | 12-18" | QA | 18-24" QA | | | | | |
| Yard (YS1) | 10/11/2010 | ARSENIC | MG/KG | 8.5 | J | 8.2 | J | 7.2 | J | 6.2 | J | | | | | NO ACTION |
| | 10/11/2010 | LEAD | MG/KG | 165 | J | 130 | J | 74.4 | J | 31.7 | J | | | | | |

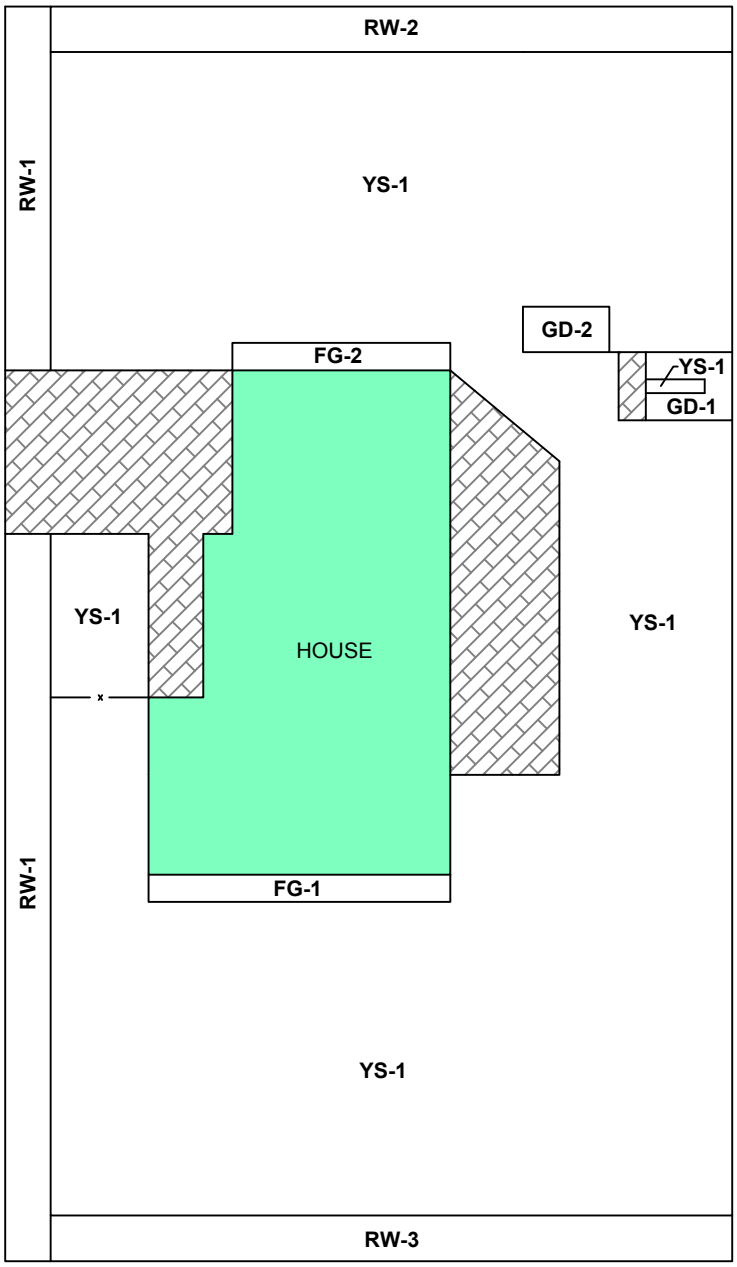
*QA = Data Qualifier. Possible data qualifiers are as follows:*

- *J = estimate, can be used for decision making;*
- *U = below detection limit;*
- *UJ = estimate below detection limit;*
- *IS = insufficient sample volume for laboratory analysis;*
- *R = reject, cannot be used for decision making;*
- *M = EPA did not have enough information to adequately review this sample.*

- *If analytes other than lead and arsenic were reported by the lab, they were also reported here.*
- *Turbidity is the cloudiness of water and is measured in Nephelometric Turbidity Units (NTUs).*

*Water action levels are as follows:*

*Arsenic=0.01 mg/L*
*Cadmium=0.005 mg/L*
*Lead=0.015 mg/L*




| | | |
|---|---|---|
| RESULT LETTER MAP | **STREET**<br>**CITY, STATE**<br><br>PARCEL 1, PARCEL 2 | SAMPLE AREAS IDENTIFIED ON THIS MAP CORRESPOND WITH YOUR RESULT LETTER. BOUNDARIES SHOWN ON THE MAP ARE NOT SURVEYED AND MAY BE INCORRECT. |

DATE

NAME
MAILING ADDRESS
MAILING CITY STATE ZIP CODE

RE: Residence at PHYSICAL ADDRESS AND PARCEL NUMBER

Dear NAME:

As part of the State of Idaho's 2011 Basin House Dust Investigation, dust samples were collected from your home. The purpose of the Basin House Dust Investigation is to evaluate house dust lead and arsenic concentrations as cleanup continues in the Coeur d'Alene Basin. This letter reports the concentration of metals (lead and arsenic) in dust samples collected from your vacuum cleaner and from the mat that was placed in your home. It also reports the dust and metals loading, which is the amount of dust and lead and arsenic that was tracked or brought into the house during the time that the mat was in your home (See Table 1). Metals results in Table 1 are reported as milligrams per kilogram of dust (mg/kg). Loading rates are reported in milligrams per square meter per day ($mg/m^2/day$). A blank indicates that no sample was collected.

**Table 1 2011 House Dust Results for: ADDRESS, TOWN**

| Vacuum Lead Concentration (mg/kg) | Vacuum Arsenic Concentration (mg/kg) | Dust Mat Lead Concentration (mg/kg) | Dust Mat Arsenic Concentration (mg/kg) | Dust Mat Dust Loading Rate ($mg/m^2/day$) | Dust Mat Lead Loading Rate ($mg/m^2/day$) | Dust Mat Arsenic Loading Rate ($mg/m^2/day$) |
|---|---|---|---|---|---|---|
| | | | | | | |

J: estimated value based on data quality review U: concentration below detection limits I.S.: insufficient sample volume for laboratory analysis

When a person comes in contact with metals in soil or house dust, he/she can inhale or accidentally swallow these metals. This is important to know because swallowing or inhaling lead is harmful to people and can cause higher than normal blood lead levels, especially to infants, children, and pregnant women. The Centers for Disease Control and Prevention (CDC) says that soil and house dust with lead concentrations that are higher than 500 mg/kg to 1,000 mg/kg may cause blood lead levels above normal levels in children. Swallowing or inhaling lead can cause problems like trouble paying attention, behavior problems, and learning difficulties.

If lead concentrations in your vacuum cleaner or from the mat placed in your home are higher than this range and if you have infants, children, or pregnant women living in your home, we recommend you take steps to reduce your and your family's contact with lead and dust in your home. The enclosed *Clean Livin'* brochure gives suggestions as to how you can reduce your and your family's contact with lead in your home.

Recreating (four-wheeling, camping, picnicking, swimming etc.) along the South Fork Coeur d'Alene River and in the Coeur d'Alene River floodplain, or other areas contaminated by mine tailings, can also increase your and your family's contact with lead in soil. If you recreate in these areas, take care to avoid contact with soils and remove loose soil from your clothing, shoes, camping equipment, toys and pets prior to leaving the area. Keep dirty items in a plastic bag and launder them separately from the rest of your wash. Clean your camping equipment away from the home, if possible.

You may see a difference between metals concentrations in dust collected from your vacuum cleaner bag and from the mat. These differences are caused by differences in how the sample was collected. The vacuum bag and dust mat results also give you different information about metals concentrations in your home. Vacuum bag samples tell you the amount of lead and arsenic in dust inside your home and in your carpet or on your floors. Dust mats tell the amount of metals and dust brought into your home from outside sources during the time that the mat was at your house.

Community averages (geometric means) for 2011 vacuum and mat dust lead concentrations range from XXX mg/kg to XXX mg/kg and XXX and XXX mg/kg, respectively, and are shown in Table 2. You can compare the lead concentrations in vacuum and dust mat samples collected from your home (Table 1) to the average concentrations for your area (shown in Table 2). This will tell you if your dust concentrations are higher than average. You can also compare your arsenic results to the amount of arsenic that is found naturally in soil in the Silver Valley to see if arsenic levels in your home are higher than expected. The natural background level of arsenic for the Silver Valley is 22 mg/kg and was determined by the United States Geological Survey after extensive testing in the Coeur d'Alene Basin.

If you find that the amount of lead or arsenic in the samples collected from your home is higher than average or higher than expected, we recommend that you damp mop and/or vacuum your home regularly and change your vacuum cleaner bags and/or filters often.

**Table 2 Preliminary 2011 Basin House Dust Results by Geographical Area**

| Geographical Area | Geometric Mean Vacuum Bag Lead Concentration (mg/kg) | Geometric Mean Dust Mat Lead Concentration (mg/kg) |
|---|---|---|
| Burke/Ninemile<br>Kingston<br>Lower Basin<br>Mullan<br>Osburn<br>Side Gulches<br>Silverton<br>Wallace | | |

As cleanup continues in the Basin, the amount of lead and arsenic in soil and dust should decrease. However, until cleanup is completed, you should continue to take steps described in the *Clean Livin'* brochure to reduce the amount of metals and dust in your home. At this time, no home cleaning activities are planned as part of the Basin cleanup.

We also want to inform you that Idaho law requires the following disclosure by the sellers/owners of residential property and real estate brokers and salespersons regarding the condition of the property.

- The "Idaho Property Condition Disclosure Act" requires seller/owners of residential real property to disclose the known presence of hazardous materials or substances to prospective buyers (Idaho Code Sections 55-2501-2518).
- The "Idaho Real Estate License Law" requires real estate brokers and salespersons to disclose all adverse material facts actually known or which reasonably should have been known about the real estate to buyer/seller customers and clients (Idaho Code Sections 54-2086 and 2087).

There are also federal regulations in Section 1018 of Title X requiring disclosure of known information on lead-based paint, dust, and soil. The presence of lead and other metals in soils found throughout the Silver Valley/Coeur d'Alene Basin are considered hazardous materials or adverse material facts and can require disclosure.

If you have any questions regarding your results or about exposure to lead or arsenic, please call me at the Panhandle Health District office in Kellogg, (208) 783-0707.

Sincerely,

Jerry Cobb
Scientist 3

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# APPENDIX B

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property
## Residential Property Enhancement Options

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| Property Enhancement Options | | | | | | |
|---|---|---|---|---|---|---|
| **Category** | **Option** | **Basic Description** | **Unit** | **Quantity** | **Unit Cost** | **Total Cost** |
| Building Drip Zone (choice of one) | 1 | Install 6-inch high, 3 feet wide raised beds with 6 inches of gravel, lightly compacted; no plants. Up to 150 linear feet. | lf | | | |
| | 2 | Install 6-inch high, 3 feet wide raised bed with 4 inches of topsoil, lightly compact, then place 2 inches of bark mulch or landscaping stone; with up to 10 plants total. Up to 150 linear feet. | lf | | | |
| Grass Area | -- | Loosen soil in bare spots and plant with grass seed. If little or no grass, power-till, level, and seed with grass. This option is at grade level. | sf | | | |
| Parking Area | -- | Case by case basis up to 400 square feet. | sf | | | |
| Walkway (Choice of one) | 1 | Install a 6-inch raised bed with 6 inches of gravel, lightly compacted. Up to 3 feet wide and up to 20 feet long. | sf | | | |
| | 2 | Install up to 30 stepping stones. Blocks should be 1 foot square or 18 inches in diameter, at least 1 inch thick but less than or equal to 2 inches thick. Spacing estimated at less than 8 inches. | ea | | | |
| Play Area and Recreation Area (Choice of one) | 1 | Install a 6-inch high, 8 foot by 10 foot raised bed with 6 inches of topsoil or gravel, lightly compacted. | ea | | | |
| | 2 | Install a 6-inch high, 8 foot by 10 foot raised bed with 6 inches of bark mulch or wood chips. | ea | | | |
| Pet Area | -- | Install a 6-inch high, 8 foot by 10 foot raised bed with 5 inches of fill. | ea | | | |
| Porch (Choice of one) | 1 | Install a 4-inch high, raised bed with 3 inches of gravel, lightly compacted. | no. | | | |
| | 2 | Install a lattice and trim over open areas. | no. | | | |

lf= linear foot
sf= square foot
ea= each
no.= number of feature conducted

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# APPENDIX C

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property
## Barrier Thickness Determination
## and
## Visual Marker Placement

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Table C-1. Residential property, Type I Commercial Property and Type I ROW remediation criteria (excluding gardens) for Pb and As.

| If Interval Equals or Exceeds 1000 mg/kg Pb and/or 100 mg/kg As | | If Interval Less than 1000 mg/kg Pb and 100 mg/kg As | | Remediation Depth | Visual Marker Placement |
|---|---|---|---|---|---|
| 0 - 1" | | 1 - 6", 6 - 12" | | 6" | No |
| 1 - 6" | | 0 - 1", 6 - 12" | | 6" | No |
| 6 - 12" | | 0 - 1", 1 - 6", 12 - 18" | | 12" | No |
| 6 – 12", 12 - 18" | **AND** | 0 - 1", 1 - 6" | **THEN** | 12 | Yes |
| 12 - 18" | | 0 - 1", 1 - 6", 6 - 12" | | NO REMEDIATION | NO REMEDIATION |
| 0 – 1", 1 - 6" | | 6 - 12" | | 6" | No |
| 0 – 1", 6 - 12" | | 1 - 6", 12 - 18" | | 12" | No |
| 1 – 6", 6 - 12" | | 0 - 1" | | 12" | No |
| 1 – 6", 6 - 12", 12 - 18" | | 0 - 1" | | 12 | Yes |
| NONE | | 0 - 1", 1 - 6", 6 - 12" | | NO REMEDIATION | NO REMEDIATION |

Table C-2. Residential property garden remediation criteria for Pb and As.

| If Interval Equals or Exceeds 700 mg/kg Pb and/or 100 mg/kg for As | | If Interval Less than 700 mg/kg Pb and 100 mg/kg As | | Remediation Depth | Visual Marker Placement |
|---|---|---|---|---|---|
| 0 - 1" | | 1 - 6", 6 - 12" | | 24" | Yes |
| 1 - 6" | | 0 - 1", 6 - 12" | | 24" | Yes |
| 6 - 12" | | 0 - 1", 1 - 6" | | 24" | Yes |
| 12 - 18" | | 0 - 1", 1 - 6", 6 - 12", 18 – 24" | | 24" | Yes |
| 18 - 24" | | 0 - 1", 1 - 6", 6 - 12", 12-18" | | 24" | Yes |
| 0 - 1", 1 - 6" | | 6 - 12" | | 24" | Yes |
| 0 – 1", 6 - 12" | **AND** | 1 - 6" | **THEN** | 24" | Yes |
| 0 – 1", 12 - 18" | | 1-6", 6-12", 18 – 24" | | 24" | Yes |
| 0 – 1", 18 – 24" | | 1 - 6", 6 - 12", 12-18" | | 24" | Yes |
| 1 – 6", 6 - 12" | | 0 - 1", 12 – 18" | | 24" | Yes |
| 1 – 6", 12 - 18" | | 0 – 1", 6 – 12", 18 – 24" | | 24" | Yes |
| 1 – 6", 18 – 24" | | 0 – 1", 6 – 12", 12 – 18" | | 24" | Yes |
| 6 – 12", 12-18" | | 0 – 1", 1 – 6", 18 – 24" | | 24" | Yes |
| 6 – 12", 18 – 24" | | 0 - 1", 1 - 6", 12 – 18" | | 24" | Yes |
| 12 – 18", 18 – 24" | | 0 - 1", 1 - 6", 6 - 12" | | 24" | Yes |
| NONE | | 0 - 1", 1 - 6", 6 - 12", 12 – 18" | | NO REMEDIATION | NO REMEDIATION |

Table C-3. Residential property, Type I Commercial Property and Type I ROW barrier enhancement (excluding residential gardens) determined by lead (Pb).

| If Interval Equals or Exceeds 700 mg/kg, but less than 1000 mg/kg Pb | | If Interval Less than 700 mg/kg | | Barrier Enhancement |
|---|---|---|---|---|
| 0 - 1" | AND | 1 - 6", 6 - 12" | THEN | Yes |
| 1 - 6" | | 0 - 1", 6 - 12" | | Yes |
| 6 - 12" | | 0 - 1", 1 - 6" | | No |
| 12 - 18" | | 0 - 1", 1 - 6", 6 - 12" | | No |
| 0 - 1", 1 - 6" | | 6 – 12" | | Yes |
| 0 - 1", 6 - 12" | | 1 - 6" | | Yes |
| 1 - 6", 6 - 12" | | 0 - 1" | | Yes |
| NONE | | 0 - 1", 1 - 6", 6 - 12" | | No |

Table C-4. Type II Commercial Property and Type II ROW remediation criteria for Pb and As.

| If Interval Equals or Exceeds 1000 mg/kg Pb and/or 100 mg/kg As | | If Interval Less than 1000 mg/kg Pb and 100 mg/kg As | | Remediation Depth | Visual Marker Placement |
|---|---|---|---|---|---|
| 0 - 1" | AND | 1 - 6", 6 - 12" | THEN | 6" | No |
| 1 - 6" | | 0 - 1", 6 - 12" | | 6" | No |
| 6 - 12" | | 0 - 1", 1 - 6" | | NO REMEDIATION | NO REMEDIATION |
| 0 – 1", 1 - 6" | | 6 - 12" | | 6" | No |
| 0 – 1", 6 - 12" | | 1 - 6" | | 6" | Yes |
| 1 – 6", 6 - 12" | | 0 - 1" | | 6" | Yes |
| NONE | | 0 - 1", 1 - 6", 6 - 12" | | NO REMEDIATION | NO REMEDIATION |

Note: Type III ROW has no excavation component.

# APPENDIX D

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property
## High Risk Property Determination

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## 1.0 DEFINITION OF “HIGH-RISK” PROPERTY REMEDIATION CANDIDATE

High-Risk property remediation candidates are defined as:

1. Homes where children six years of age and under are in residence.

2. Homes with pregnant women in residence.

3. Licensed Day Care Centers.

4. Homes where the most recent blood lead survey indicates that children in residence have a blood lead level equal to or greater than 10 µg/dl and the PHD has determined that the yard soil exposure is a significant exposure pathway.

Once one of these properties is identified, it becomes a high priority for sampling. If sampling reveals contaminant levels above action levels, the property becomes a high priority for remediation.

## 2.0 ADDING “HIGH-RISK” RESIDENTIAL PROPERTY TO THE IDEQ WORKPLAN

The IDEQ is expediting sampling of Basin property in an effort to both identify property requiring remediation and to identify high risk property requiring remediation. The IDEQ, in consultation with the EPA and PHD, will create a “high risk” yard remediation candidate list each year. The high risk list will be periodically updated, as sampling data becomes available and as additional high risk properties are identified. Candidates for the high risk list may be identified through sampling activities, mass mailing questionnaires, advertisements, telephone call-ins, door-to-door visits, or other methods (such as most recent blood lead survey through PHD).

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# APPENDIX E

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Access, Arbitration, Warranty, and Work Completion Agreement

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# Coeur d'Alene Basin Consent Agreement
# Access, Arbitration, Warranty, and Work Completion

This agreement is by and between the undersigned property owner or designee (and tenant if applicable), and the Idaho Department of Environmental Quality (IDEQ), Panhandle Health District (PHD), U.S. Environmental Protection Agency (EPA), their representatives, personnel acting at their request, and the designated IDEQ contractor(s). The property owner (and tenant where applicable) grant the IDEQ, PHD, and EPA (the entities), and their designated IDEQ contractor(s) and representatives access without charge to the property located in the State of Idaho, as described below:

---

Address

---

City

---

Property Identification Number (IDEQ Number)

**1.0 Scope -** Access is granted for the identified entities and their representatives (including subcontractors) to conduct remediation work identified in the Coeur d'Alene Basin Property Remedial Design Report and plans prepared specifically for the identified. The entities performing the work will consult with the owner or designee and tenant as necessary to determine schedules and scope of work, including removal and replacement of existing soil, gravel, sod and other items. Prior to initiating on-site work, the entities and owner/tenant will participate in a property walkthrough to review the scope and schedule for remediation work.

**2.0 Time -**The entities and their representatives shall have access to the property at all reasonable times and upon reasonable notice to the owner/tenant for the duration of this agreement.

**3.0 Duration -** This agreement shall remain in effect until certification by IDEQ and EPA that work relating to the property has been satisfactorily completed.

**4.0 Waiver -** The owner/tenant expressly waive any claims against the entities and their representatives, jointly or individually, for any alleged taking of the property by virtue of access or entry upon the property or performance of any work. The owner/tenant further waive any and all claims including, but not limited to, all claims for damages, lost profits or diminution of property value, jointly or individually, by virtue of non-negligent and non-tortuous performance of work.

**5.0 Access for Inspections -** The owner and tenant grant the identified entities and their representatives, access to the property to conduct project oversight, soil sampling and inspections, as necessary and at all reasonable times and upon reasonable notice to the owner/tenant.

**6.0 Binding Effect -** This agreement shall bind the entities and owner/tenant and each of their successors and assigns.

# Coeur d'Alene Basin Consent Agreement
# Access, Arbitration, Warranty, and Work Completion

**7.0 Warranty -** The Idaho Department of Environmental Quality (IDEQ) contracts with remediation contractors (Contractors) to perform remedial actions. Within their contracts Contractors agree to provide warranties for portions of the remedy and to repair damages to existing structures and vegetation (plants, shrubs, and trees) resulting from the remediation work. The applicable portions of the contract are found below.

Section 2.2.1.8 - Repair Damages of the contract states:

> *"The contractor will repair any damages that occur as a result of remediation activities, and repair damages noted during construction activities, as they become known. Repairs will be to pre-existing conditions or better and to the satisfaction of the property owner and IDEQ. The contractor is responsible for damages to existing structures for 180 calendar days and existing vegetation for one (1) year from the date of completion of property remediation."*

Section 2.3.7 - Warranty the Remedy of the contract states:

> *"The Contractor's signed warranty includes guaranteeing the sod/seed for 45 days after installation. For areas where sod is placed or that are hydro-seeded after October 1 the warranty period for grass will extend until May 15 of the following year. Planted shrubs and trees will be guaranteed for 1 calendar year after completion of installation. The Contractor will be responsible for replacing, with nursery stock, any vegetation that dies as a result of the remedy process. Site drainage will be guaranteed for the 2 calendar years following the completion of remediation. The Contractor will also need to repair damage resulting from poor drainage and correct drainage problems within the warranty period. Warranties extend beyond the period of the contract or termination thereof."*

These sections of the contract provide the IDEQ and therefore the property owners with applicable warranties and assurances that damages due to remedial activities will be corrected by the Contractor (s).

In the event of a disagreement between the parties Contractor and IDEQ agree to arbitration to address differences.

Note: If owner alleges damages or has warranty claims it is necessary for the owner to notify the IDEQ as soon as possible so that the claim can be investigated and repaired if appropriate. Notification must be within 1 year for vegetation (plants, shrubs, and trees), claims and within 2 years for drainage claims.

The telephone number for the IDEQ in Kellogg is 208-783-5781.

# Coeur d'Alene Basin Consent Agreement
# Access, Arbitration, Warranty, and Work Completion

**8.0 Disputes and Arbitration Agreement -** Should there be disputes between the owner/tenant and any participating entity, every attempt will be made to resolve the dispute informally within the scope of work for the specific property. If an agreement or resolution cannot be made, an arbitration panel will make a final decision concerning the dispute in accordance with this agreement.

8.1 Purpose of Arbitration - This agreement contains the procedures to be followed for resolving disputes that arise over damage to Basin property (residential property, commercial property and rights-of-way). These disputes may be caused by or result from remediation activities pursuant to the Coeur d'Alene Basin Property Remedial Design Report. The parties agree that these proceedings are confidential and they are entitled to the same privileges that apply generally to settlement negotiations.

8.2 Arbitration Panel - Should there be any dispute at any time between the property owner(s), and/or IDEQ or their representative, and/or the Contractor, the parties involved will notify the IDEQ and every attempt will be made to resolve the dispute informally within the scope of work for that property. If the dispute is between the property owner(s) and the Contractor, IDEQ will make every attempt to assist in settling the matter. The IDEQ will notify the EPA about any disputes. If the parties involved in the dispute cannot reach an agreement, then the dispute will be brought before the Arbitration Panel. The parties agree that an Arbitration Panel is authorized to settle the dispute over damage to Basin property and any other issues authorized by the parties. The parties further agree that the decision of the Arbitration Panel will be final and binding on all parties.

The Arbitration Panel will consist of three individuals, consisting of one representative each from of the following:

1) State of Idaho
    - ♦ The Environmental Health Supervisor of the Panhandle Health District
2) Coeur d'Alene Basin Commission
    - ♦ Commissioner or designated representative of the Commission
3) Local government in the Silver Valley
    - ♦ If the property is in a city, a member of the city council will represent this entity.
    - ♦ If the property is in the county, a member of the County Commissioners will represent this entity.

8.3 Meeting Regarding Dispute - Within ten (10) working days of notification that a dispute needs to be resolved, the parties and the Arbitration Panel will meet at the site of the alleged damage to resolve the dispute. Each party will explain to the Arbitration Panel, using witnesses, videotapes, photographs, documents, and other information, the following items:

- The nature of the damage.
- Each of the party's description of how the damage was caused.
- The measures, if any, that should be taken to repair the damage.

In addition to asking clarifying questions, the Arbitration Panel may act as a moderator. However, the panel will not preside like a judge, and the formal rules of evidence will not apply. The meeting will not be recorded, but any party or the panel may take notes of the proceedings.

Immediately after the parties have presented the information, the Arbitration Panel will meet, by themselves, and come to a consensus regarding a resolution to the dispute. At least two (2) members of the panel must agree on the proposed resolution for it to be binding on the parties. The panel will inform the parties in writing of their decision no later than 5:00 p.m. of the same day, unless both parties agree in writing to an extension of time.

After the Arbitration Panel has rendered its decision, the panel will return all dispute-specific information provided by the parties, and destroy any notes concerning the dispute.

8.4 Costs of Arbitration - There will be no charge to the property owner for any expenses incurred by the Arbitration Panel. Expenses of providing information to the Arbitration Panel will be borne by the party producing such information.

**9.0 Effective Date of Agreement -** This agreement shall be effective when all parties have executed this agreement as evidenced by signatures of the parties or their representatives below.

# Coeur d'Alene Basin Consent Agreement
# Access, Arbitration, Warranty, and Work Completion

Property Address

City Property Information Number

Owner/Tenant Signatures

| | |
|---|---|
| Signature of Owner (or designee) | Signature of Tenant |
| Date signed | Date signed |
| Print Name(s) of owner(s) or designee(s) | Print Name(s) of tenant(s) |
| Owner's Mailing Address | Tenant's Mailing Address |
| Owner's Telephone Number | Tenant's Telephone Number |

Government/Contractor Signatures

| | |
|---|---|
| Signature of Government Representative | Signature of Contractor |
| Title | Title |
| Date signed | Date signed |
| State of Idaho ~ Department of Environmental Quality | |
| Print Name(s) of Government Representative(s) | Print Name(s) of Contractor(s) |
| 1005 McKinley Avenue<br>Kellogg, Idaho 83837 | |
| Government's Mailing Address | Contractor's Mailing Address |
| (208) 783-5781 | |
| Government's Telephone Number | Contractor's Telephone Number |

***Work Completion Sign Off (Post-remediation)*** **-** With the exception of warranty items (vegetation or drainage), the work as outlined on the plot plan has been satisfactorily completed. If efforts to gain the signature are unsuccessful, the warranty period will commence on the date the work was considered complete by the government. Written notification of this completion date will be mailed to the property owner. The lack of a property owner's signature will not hinder the closure of the property.

Completion Signature Agreement:

Government: _____ Contractor: _____ Owner: _____

Date: _____ Date: _____ Date: _____

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# APPENDIX F

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property
## Barrier Maintenance Plan

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## RESIDENTIAL BARRIER MAINTENANCE PLAN

You have been provided with a clean barrier covering existing lead and arsenic contaminated soils. The long term maintenance of this barrier is the sole responsibility of the property owner. These remedies will provide protection only as long as they are kept in good condition. This manual provides information necessary to cover long term protection of your barrier.

Any further excavation work on your property will need to comply with the current requirements of the Institutional Controls Program (ICP). For questions regarding the ICP, please contact Panhandle Health District, at (208)783-0707. As a reminder, before digging on your property, have all underground utilities marked by calling 1-800-398-3285. You need to give them 48 hours notice before you plan to dig.

***Vegetation***

- **Watering:** Water grass on a regular basis. More water is necessary during hot, dry and windy weather. Water the grass with sprinklers and hoses. Water should be applied as needed, but not less than 30 minutes in the morning approximately once or twice per week. Water application can be modified based on weather. Watering less often may be required if precipitation occurs. When applying water, do not allow run-off or ponding to occur. Slow deep watering is best.

  Note: The Contractor's responsibility for watering the grass ends 45 days after completion of sod installation or grass seed application.

- **Grass:**
  1. Start mowing regularly following the initial 45 day period.
  2. The mower blade should be sharp.
  3. The mower should be set to cut at a height of 2 to 2½ inches.
  4. Clippings should be left on the lawn to provide nutrients.
  5. Avoid scalping the lawn.

  Remove thatch when more than ½ inch accumulates at the soil surface. Thatch will prevent the proper penetration of air, water and nutrients to roots. A thatch removal attachment for rotary mowers works well.

  Once per year, reseed bare spots (either in the spring or early fall). Hand rake bare soil to loosen the top 2 inches. The grass seed mixture (i.e., approximately equal percentages of perennial rye grass, blue grass and fescue) should be applied at the rate specified by the manufacturer or supplier. A hand or drop spreader should be utilized to distribute grass seed evenly over the bare spots.

  Aeration of soil is important for grass growth and survival. Utilize a solid-tine or a hollow-tine aeration machine. Aeration holes should penetrate at least 3½

inches. The soil should be moist, but not saturated when aeration is done. Aeration should be conducted in the spring.

Apply grass fertilizer four times per year, or as necessary –

1) mid April
2) late May/early June
3) late August/early September
4) late October/early November

Fertilizer should have a nitrogen-phosphorus-potassium ratio of 3-1-2. The nitrogen should be slow-release. The fertilizer should be spread using a "whirlybird" or equivalent applicator. The fertilizer should be applied in accordance with specific fertilizer manufacturer or supplier directions.

- **Trees:** Prune once per year in late winter. Improper pruning will create an entry point for disease and insects to damage the tree. Pruning cuts should be made on the outside (i.e., branch side) of the branch collar. Stubs and flush cutting should be avoided. A small notch should be cut first on the underside of the branch to be removed approximately six inches from the trunk to prevent bark and stem tissue tears. The branch should then be cut from the top. The 6-inch stub should be removed as the final step. Only sharp tools are to be used to prune trees to create a clean cut to promote healing.

- **Shrubs/plants:** Remove weeds and debris from around shrubs and plants at least three times per year. The soil in raised bed boxes dries out,more quickly than soil at ground level. Therefore, plants and shrubs will require more water during dry periods.

- **Gardens:** Plant residue should be tilled into the soil at the end of the growing season or in early spring to provide additional organic matter.

***Gravel***

- **Driveway and/or walkway:** Remove weeds and debris. Rake and replenish as needed to provide a level surface. Maintain drainage away from structures.

- **Under decks and/or porches:** Remove weeds and debris, where accessible. Rake and replenish as needed to maintain a smooth surface.

***Asphalt***

- **Driveway and/or walkway:** Keep the asphalt surface free from gasoline, oil and other petroleum substances. Petroleum products can weaken the asphalt binder. Application of de-icing chemicals should not have a negative impact on the properly designed and installed asphalt.

Remove loose material from cracks, and then fill them with asphalt crack filler or emulsion before applying seal coat. Application of crack filler should be conducted in accordance with supplier or manufacturer's instructions.

Seal coat should be applied when the asphalt becomes porous (doesn't shed water), typically within one year and thereafter every two to three years. Asphalt seal coat should be applied when asphalt appears dry, brittle, shows heavy cracking, raveling, or exhibits void and pothole creation. Seal coat application should be in accordance with supplier or manufacturers instructions.

Repair as necessary with black top patch. Patch application should be in accordance with supplier or manufacturers instructions.

***Concrete***

- **Driveway and/or walkway:** Sweep dirt and debris accumulations from the surface and apply seal coat to the surface regularly. Seal coat application should be in accordance with supplier or manufacturers instructions.

  During winter, care should be taken that the concrete surface is not damaged during snow removal. Application of de-icing chemicals will have a negative impact on the concrete surface. Promptly remove all ice and snow from concrete surfaces.

  As concrete ages it will develop cracks. Joints are placed to minimize cracking. Remove weeds from joints and cracks. Repair cracks with appropriate caulk or Portland cement bond compound. Repairs should be in accordance with supplier or manufacturers instructions.

  Replace broken sections as necessary. The city, county or concrete supplier can provide mix designs and information regarding placement of concrete.

***Stones***

- **Stepping and Paver stones:** Stones may be placed along walkways, patios, or shed or garage floors. Sweep dirt and dust accumulations from the surface of stepping and paver stones. Inspect stepping and paver stones once per year for cracking and spalling. Replace stepping and paver stones if cracking or spalling results in an unsafe surface. Reseed bare soil around the stepping stones with grass.

***Fence***

- **Fences:** Remove weeds and debris from around fence. Stabilize posts as necessary. Care should be taken when digging around fence lines. Not all contaminated soil may have been removed from around fence posts or along the fence line. In most cases the fence was left in-place during remediation. All soil encountered during digging should be disposed of appropriately.

***Lattice***

- **Lattice:** Lattice is used to restrict access under porches or decks. Replace broken or missing sections as necessary.

***Retaining Walls & Cribbing***

- **Retaining Walls and/or Cribbing:** Cribbing and/or retaining walls help stabilize hillside soil. They should be inspected annually for damage, deterioration, or movement. If unstable, have a landscaping contractor repair or replace. Remove weeds and debris from joints and cracks.

***Wooden Floors***

- **Garages and/or Sheds:** Garages and/or sheds on the property may have wooden floors. The soil underneath wooden floors was not remediated and therefore could be contaminated. The wooden floors act as a barrier to the contaminated soil. Sweep dirt and debris accumulations from the wooden floor surface. Keep water off the wooden floor to prevent water damage and rot. Apply water seal in accordance with supplier or manufacturers instructions. Wooden floors should be inspected annually for damage or deterioration. If damaged, make necessary repairs as needed.

***Raised Bed Boxes***

- Raised bed boxes may be located on the property (e.g., along driplines of structures, in play areas, in garden areas or under porches and decks). Each box is constructed from pressure treated lumber for outdoor use. A filter fabric is placed in the box. A soil, gravel, mulch, and/or wood chip fill may be placed in the box.

  **Box:** Once per year check screws and other connections making sure they are secure and flush with the wood.

  **Fill:** Remove weeds and debris accumulated in fill. It may be necessary, especially for mulch and wood chips, to replenish the fill.

Additional maintenance activities may include the following:

# APPENDIX G

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property Remediation Assessment and Certification

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# COEUR d'ALENE BASIN
# REMEDIATION ASSESSMENT AND CERTIFICATION

## Purpose

To provide the Project Coordinator, or designated representative, with a procedure for evaluating and certifying that soil barrier layers in a specific geographic area, placed during remediation of residential property, commercial property and rights-of-way are in conformance with the requirements of the Bunker Hill Mining and Metallurgical Complex, Operable Unit 3, Record of Decision (ROD) and the Performance Standards outlined in the applicable Remedial Design Report (RDR).

## Procedure

Compliance assessments shall be conducted on residential property, commercial properties or distinct rights-of-way ("properties"), as applicable, within a specified geographic area. Sample collection and assessment shall be in accordance with the following procedures:

1. Compliance assessments should be conducted immediately upon completion of placement of clean barriers in all property requiring remediation of the selected geographic area. In preparation for the assessment, a review shall be made of available pertinent documentation for the selected property, including analytical data collected prior to remediation; remediation plan, work authorization; photographs; etc.

2. Soil samples shall be collected from two representative and discrete locations on 10 percent of the remediated property in the selected geographic area; one sample from the front and one sample from the back, each in the approximate center of the remediated area and at least ten feet from any tree, structure or other object that may restrict the thickness measurement of the barrier layer. Samples shall be collected using a suitable sampling device, permitting collection of an undisturbed sample. Soil samples shall extend continuously from the upper surface of the barrier layer to the depth of the barrier for the subject property.

3. The effective thickness of the installed barrier layer shall be assessed by measuring the length of the collected sample from the upper surface of the barrier

layer material to the distinguishable interface between the newly placed barrier material and the underlying native soils. Determination of the barrier layer/native soil interface shall rely upon visual observation.

4. Upon completion of sampling and assessment activities, samples shall be replaced in the core hole and the site restored to the condition found prior to sampling.

5. Confirmation sampling activities shall be documented by the Project Coordinator, or designated representative, performing the assessment. If the barrier thickness is in compliance with the remediation plan for the property, the certification of acceptance shall be completed. If a collected sample indicates that the remediation in the sampled area is not in compliance with the remediation plan, two additional samples shall be collected from the vicinity of the failed sample and assessed to confirm whether the deficiency is real or is the result of sampling error. Where deficiencies are identified, the nature of the deficiency shall be explained as part of the documentation. Any deficiencies will be made known to the IDEQ Project Coordinator, so that appropriate corrective action may be taken expeditiously. Corrective actions taken shall also be documented. Upon completion of necessary corrective actions, the certification and acceptance shall be completed for the specific geographic area assessed.

# APPENDIX H

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Property Disclosure Form

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***IDEQ Letterhead***

Your property was sampled as part of the Basin Environmental Improvement Project Commission's yard program, or a previous sampling program. The purpose of this testing was to determine lead and arsenic levels in property. Sampling included maintained yard areas, gravel driveways or parking areas, gardens, play areas, rights-of-way, etc. If your water source is a private well, a water sample was also collected. The results of your sampling were sent to you under separate cover. Based on sampling results, part or all of your property was remediated according to an agreed upon construction plan and with your consent:

- **Barrier Enhancement (Greening)** – If the lead concentration in your soil or gravel (in the top 12-inches only) is between 700 - 999 mg/kg, then remedial action may have included enhancement by placement of additional soil or gravel. Sod or grass seed may have been applied over soil too. These activities were conducted to enhance the existing surface. Areas on your property that were enhanced are identified on the attached as-built map.

- **Partial Removal and Replacement** – If the soil or gravel tested over 1,000 mg/kg lead, or over 100 mg/kg arsenic (in the top 12-inches only), then remediation may have included partial removal of contaminated materials (up to 12 inches, excluding gardens where the depth may be up to 24 inches) and replacement with clean soil or gravel. Yard areas may have received sod or grass seed. Areas on your property that had partial removal and replacement are identified on the attached as-built map.

Clean replacement material (soil, gravel, etc.) contains less than 100 mg/kg lead, 35 mg/kg arsenic and 5 mg/kg cadmium based on the average of backfill sampling results. No single sample of replacement materials exceeded 150 mg/kg lead or 45 mg/kg arsenic.

The Remediation Contractor may have placed sod or grass seed over replacement soil. If sod or grass seed was applied to your property, the Remediation Contractor applied water, as necessary, to the new sod or grass seed to ensure the sod/seed was knitted together and the roots were well established. The Remediation Contractor also provided a 1-year warranty for installed trees/shrubs and a 2-year warranty on drainage for the property. A signed warranty should be in your possession.

Please consult the Barrier Maintenance Plan for general guidance on caring for your yard and maintaining the integrity of barriers installed on your property.

If you have any questions or concerns about the yard program, feel free to contact Scott Peterson at Kellogg IDEQ (783-5781). If you have questions or concerns about exposure to lead or arsenic call Jerry Cobb at Panhandle Health District (783-0707).

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# APPENDIX I

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential, Commercial and Rights-of-Way Property Construction Forms

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**List of Forms**

Barrier Enhancement – No Action Form

Request for Information

Contractor Submittal Log

Contractor Daily Report

Non-Compliance Form

Non-Compliance Log

Change Order Form

Change Order Log

Questionnaire for Domestic Water Well Owners

Well Closure Record

Alternative Water Supply Record

Punch List Form

Property Completion Form

Weekly Progress Meeting Agenda

Asphalt Agreement

Weekly Synopsis Contractor Progress Update

Weekly Detail Contractor Progress Update

Daily Truck Load Report

Daily Water Log Report

**IDEQ BARRIER ENHANCEMENT – NO ACTION FORM**

**Date:** _____

**Project:** _____

**Property Owner/contact information:** _____

**Location/Address:** _____

_____

**Discrete Area(s) Being Reviewed:** _____

_____

For residential property having sample results with a lead content of greater than 700 mg/kg, but less than or equal to 999 mg/kg, barrier enhancement is the prescribed remedy. For the property identified above, an enhancement remedy was the only specified remedy. However, during the walkthrough, there were no enhancement actions available that would improve upon the current, existing condition of the area for which this remedy was identified.

For the property identified above, the IDEQ Project Coordinator has reviewed the sample map and data, and walkthrough notes, and has also conducted a site visit to visually observe conditions of the barrier enhancement remedy area(s). Based on these activities, the Project Coordinator makes the following recommendations:

☐ Confirm **NO ACTION –** develop property as-built plot plan.

☐ Recommend **REMEDIAL ACTION –** develop property construction plot plan (see marked sample map for notes on barrier enhancement remedial action(s) to implement).

**Photograph(s):** _____

_____

_____

**Additional Notes:** _____

_____

_____

**IDEQ Project Coordinator (signature):** _____

Distribution: Project File EPA Project Manager IDEQ Project Manager Drafter

**REQUEST FOR INFORMATION FORM**

Request Date: _____

Contract No.: _____

Project: _____

Location: _____

To: Idaho Department of Environmental Quality
1005 W McKinley
Kellogg, ID 83837

Attention: _____

Response Required by: _____

Reason for Request:

□ Insufficient Information □ Engineering Conflict □ Alternative Proposal

□ other _____

Action Requested:

□ Clarification □ Direction □ Approval

Probable Effect:

□ Increased Cost □ Increased Time □ Decreased Cost □ Decreased Time

□ No Change

---

Information Needed (Submitted by_____):

---

Recommendation (Submitted by _____):

---

□ Proceed with Recommended Solution

□ Proceed with These Instructions:

Contractor Representative: _____Title: _____

---

Distribution: Project File Contractor IDEQ Project Manager

**CONTRACTOR SUBMITTAL LOG**

Contract No. _____ Project: _____ Page ___ of ___

| Contractor Submittal No. | Contractor Document Title | Document Date | First Submittal Received | Second Submittal Received | Notes |
|---|---|---|---|---|---|
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**IDEQ NON-COMPLIANCE FORM**

Non-Compliance Form Number: _____

Project: _____ Project Number: _____

Date Issued: _____ Time Issued: _____

Issued by: _____ Signed: _____

Title: _____

To: _____

Received by: _____ Date: _____

Title: _____

---

The following item(s) is/are in non-compliance with the Contract Documents. Corrective Action is to be undertaken immediately. The Contractor has ___ days or ___ hours to complete the non-compliance. The Contractor will complete the necessary Corrective Action at no additional cost to the project. Penalties for not completing the Corrective Action within the specified time period may apply.

---

Description:

Contractor's Corrective Action Proposal:

Contractor Project Manager: _____ Date: _____

---

Corrective Action Compliance: the Contractor has complied with the corrective action proposal. The remedial work has been inspected and accepted.

IDEQ Project Manager: _____ Date: _____

---

Distribution: Project File Contractor IDEQ Project Manager

**IDEQ NON-COMPLIANCE LOG**

Contract No. _____ Project: _____ Page ___ of ___

| NCF No. | Date Prepared | Description | Sent to Contractor | Corrective Action | Completed |
|---|---|---|---|---|---|
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**IDEQ CHANGE ORDER**

Change Order Number: _____

Project: _____ Project Number: _____

Date Issued: _____ Time Issued: _____

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The Contract is changed as follows:

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Description:

Method of Cost Adjustment: _____

Time provided for completion of above-described work is increased by _____

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Recommended by: _____

Title: _____ Date: _____

To: _____

Accepted by: _____ Date: _____

Title: _____

Approved by: _____ Date: _____

Title: _____

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Distribution: Project File Contractor IDEQ Project Manager

**IDEQ CHANGE ORDER LOG**

Contract No. _____ Project: _____ Page ___ of ___

| Change Order No. | Date Prepared | Description | Sent to Contractor | Received from Contractor | Approved Time | Approved Amount | Closed |
|---|---|---|---|---|---|---|---|
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# IDEQ QUESTIONNAIRE FOR DOMESTIC WATER WELL OWNERS

Date: _____

Project: _____

| Well Owner Information | Interviewer Information |
|---|---|
| Name: | Name: |
| Address: | Company: |
| | Address: |
| Phone: | |
| **Well Completion Details** | |
| Well Depth: | Date Drilled: |
| Casing Depth: | Drilling Method: |
| Casing Type: | Borehole Diameter: |
| Casing Diameter: | Filter Pack Interval: |
| Type of Surface Seal: | Type of Filter Pack: |
| Depth of Surface Seal: | Screened Interval: |
| Pump Depth: | Pump Type: |
| Formation Name: | |
| Location of Well on Property: | |
| **Water Use** | |
| Is the well water used for domestic purposes? | |
| Is the well water used for irrigation? | |
| List other uses of the well water. | |
| What is the approximate daily well water use? | |
| How many people in the residence using well water? | |
| **Alternative Water Sources** | |
| Is the residence serviced by an existing water district? | |
| Identify water sources other than domestic well or water district supplies serving the residence. | |
| Identify the conditions associated with connection to an existing water district supply. | |
| Identify the conditions associated with installing a new domestic water well. | |
| Identify the condition associated with installing a point-of-source treatment system. | |

| Description of Well Head Access Conditions |
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| Comments and Suggestions Concerning Well Closure |
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| Additional Comments/Notes |
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Interviewer: _____ Title: _____

Distribution: Project File Interviewer Company IDEQ Project Manager

# IDEQ WELL CLOSURE RECORD

Date: _____

Project: _____

| Well Owner Information | Consultant Information |
|---|---|
| Name: | Name: |
| Address: | Company: |
| | Address: |
| Phone: | |
| **Contractor Information** | |
| Name: | Company: |
| Equipment On-site: | |
| **Well Abandonment Details** | |
| Well Depth: | |
| Depth to Water: | |
| Well Diameter: | |
| Type of Sealing Material: | |
| Volume of Sealing Material: | |
| Obstructing Material Removed from Well (electrical wiring, pump, etc.): | |

| Sealing Agent | Bottom Depth | Top Depth | Start Time | End Time | Injection Method | Casing Perforation Method | Bottom Depth | Top Depth | Start Time | End Time | Inject. Press. |
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Comments:

| Material Volumes | | | | |
|---|---|---|---|---|
| Sealing Agents | Number of Sacks | Number of Buckets | Cubic Feet | Cubic Yards |
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Contractor: _____ Title: _____

Distribution: Project File Contractor Consultant IDEQ Project Manager

# IDEQ ALTERNATIVE WATER SUPPLY RECORD

Date: _____

Project: _____

| Property Owner Information | Consultant Information |
|---|---|
| Name: | Name: |
| Address: | Company: |
| | Address: |
| Phone: | |
| **Contractor Information** | |
| Name: | Company: |
| Equipment On-site: | |

**Alternative 1: Connection to Existing Water Distribution System**

| Materials | Material Quantities | Begin Date | End Date |
|---|---|---|---|
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**Alternative 2: New Well**

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|---|---|
| Well Depth: | Date Drilled: |
| Casing Depth: | Drilling Method: |
| Casing Type: | Borehole Diameter: |
| Casing Diameter: | Filter Pack Interval: |
| Type of Surface Seal: | Type of Filter Pack: |
| Depth of Surface Seal: | Screened Interval: |
| Pump Depth: | Pump Type: |
| Formation Name: | |
| Location of Well on Property: | |

| **Comments/Notes** |
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Contractor: ____________________________________________ Title: ___________________

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Distribution: Project File Contractor Consultant IDEQ Project Manager

**IDEQ PUNCH LIST FORM**

| Contractor: | | | | |
|---|---|---|---|---|
| Date | Property Address | Problem or Failure To Be Repaired | Corrective Action Taken | Date Corrected |
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**PROPERTY COMPLETION FORM**

**Project Location: _____**

| Date | Description | Signature | Completed | Checked |
|---|---|---|---|---|
| | **Property Owner** | | | |
| | **Contractor Rep.** | | | |
| | **Project Rep.** | | | |

**Basin Yard Remediation Program**
**Weekly Meeting – Month Day, Year**
**With "Name of Contractor"**

**Meeting participants:**

Idaho Department of Environmental Quality (IDEQ):
Environmental Protection Agency (EPA):
TerraGraphics (TG):
North Wind International (NW):
"Name of Contractor (_____)":

**Agenda** (presented by Scott Peterson (moderator) at the meeting)

Contractor Report
TerraGraphics Report
North Wind Report
Health and Safety
IDEQ Issues
Other Issues

**Purpose/Scope:**

- Allow each in attendance to provide a status report to other participants
- Identify and resolve issues regarding the program
- Conduct long-term planning and scheduling activities

**Objective:** Identify action items to complete for the next week as follows:

Contractor Report

- Property status of activities to-date (handout).
  ___ properties completed
  ___ properties need owner signature
  ___ properties being excavated
  ___ properties being backfilled
  ___ properties for sod
  ___ properties for seed
  ___ properties awaiting punchlist completion
  ___ properties completed this week

TerraGraphics Report

**North Wind Report**

***Yard Oversight***

***Submittals***

***Action Items***

***Safety Issues***

***Big Creek Repository***

**Health and Safety**

**IDEQ Issues**

**Other Issues**

**Next meeting (if necessary)**
Day of Week, Month Day, Year
Time Pacific Time
Location: IDEQ office in Kellogg
Call-in number: (208) 783-5781
Moderator: Scott Peterson (IDEQ)

**Notes:** recorded by _____ ("entity")

# ASPHALT AGREEMENT

IDEQ has proposed to install a gravel cap at the address/Parcel number identified below in implementing the human health remedy for Operable Unit 3 of the Bunker Hill Mining and Metallurgic Complex Superfund Site. IDEQ acknowledges that the property owner has requested an asphalt cap instead of the gravel cap. It is understood that IDEQ will honor this request as long as the costs of paving do not exceed the full removal/replacement cost estimate or, if they do, the property owner agrees to pay those excess costs. IDEQ will place a gravel subgrade which in most cases will not exceed approximately three (3) inches and not exceed four (4) inches of asphalt. This does not constitute an engineered road design and is not expected to be as durable as a road. The property owner recognizes that this is not an engineered road. They will be responsible for future repairs that ensure there is no potential for human contact with lead (Pb) and arsenic (As) contamination beneath the installed remedy. The property owner also recognizes that the asphalt cap is the final remedy for this property.

The property owner agrees to and accepts the above remedy outline and fully assumes the responsibility of long term maintenance of the asphalt cap. Any future activities that would impact the asphalt cap shall be conducted in compliance with the Institutional Controls Program (ICP) administered by the Panhandle Health District. The guidelines of this maintenance agreement conform to the ICP within the Bunker Hill Mining and Metallurgic Complex Superfund Site Operable Unit 3 boundaries.

Address/Parcel Number _____

Signature of IDEQ Representative:

_____ Date: _____

Signature of Owner or Owner's Representative:

_____ Date: _____

**Weekly Synopsis** **Week:** _____

# CONTRACTOR NAME

| Total Property Counts | |
|---|---|
| | **Properties** |
| | **HR Properties** |
| | **Completed Properties** |
| | **Completed HR Properties** |
| | **Completed Properties Current Week** |
| | **Completed HR Properties Current Week** |

| **Mullan** | | **Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature)** |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| **Wallace (Nine Mile & Burke)** | | **Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature)** |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| **Silverton** | | **Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature)** |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| Osburn (Terror & Two Mile) | | Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature) |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| Kellogg (BC, EC, Moon, Mont) | | Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature) |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| Pine Creek | | Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature) |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

| Kingston/Cataldo/Rose Lake | | Listing of Properties Open (excavation, backfill, sod/seed, punchlist, waiting on owner signature) |
|---|---|---|
| | total properties | |
| | completed properties | |
| | excavation | |
| | backfill | |
| | sod/seed | |
| | punchlist | |
| | waiting on owner signature | |

# CONTRACTOR NAME

**Weekly Detail** **Week:** _____

**Mullan**

| Contractor Property Number | House Number | Street Name | Status | Start | Finish | HR (Y/N) | Comments |
|---|---|---|---|---|---|---|---|
| | | | invoiced | | | | |
| | | | waiting for sign-off | | | | |
| | | | excavation | | | | |
| | | | backfill | | | | |
| | | | sod | | | | |
| | | | seed | | | | |
| | | | punchlist | | | | |
| | | | completed | | | | |
| | | | cost estimate in | | | | |
| | | | on hold | | | | |
| | | | returned | | | | |

# Daily Water Log

Date:

Day: (circle the one that applies)

Mon Tue Wed Thur Fri Sat Sun

Weather:

| | Temp | Precip | Other |
|---|---|---|---|
| Start of shift | | | |
| Afternoon | | | |
| End of shift | | | |

Contractor:

Subcontractor (if any)

| Property Address | | | (CHECK ALL THAT APPLY) | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|
| House ID | Street | Town | Decon Equipment | Site Clean Up | Dust Control | Compaction | Sod/Seed | Other | |
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Problems/Delays/Other Issues/Punchlist:

# Daily Truck Load Report

Truck No. _____
Truck Description _____
Truck Owner _____
Driver's Name _____

Date _____
Shift Start _____
Shift End _____
Hours Worked _____

| From Address | | | Time Dumped | Material Hauled (check one) | | | | Quantity | Unit | Scale Ticket No. (if any) | To Address | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| House ID | Street | City | | Waste | Topsoil | Gravel | Other | | | | House ID | Street | City |
| | | | | | | | | | | | | | |
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Driver's Signature

Supervisor's Signature

# Daily Foreman's Site Report

**Date:** **Property Address:** **House ID** **Street** **Town**

**Work Performed (List)**

| | Excavation | Tree Hand Excavation | Fabric | Backfill Topsoil | Backfill Gravel | Backfill Compaction | Garden Soil | Greening | Landscape Rock/Lava Rock | Sod | Hydroseeding | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Foreman/Lead Person:** | | | | | | | | | | | | |
| **Crew:** | | | | | | | | | | | | |
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| **Equipment:** | | | | | | | | | | | | |
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| **Crew Hours:** | | | | | | | | | | | | |
| **6-In Excavation (Y/N)** | | | | | | | | | | | | |
| **12-In Excavation (Y/N)** | | | | | | | | | | | | |
| **24-In Excavation (Y/N** | | | | | | | | | | | | |
| **6-In Backfill (Y/N)** | | | | | | | | | | | | |
| **12-In Backfill (Y/N)** | | | | | | | | | | | | |
| **Garden Soil Backfill (Y/N)** | | | | | | | | | | | | |
| **Trees <6-In (quanity)** | | | | | | | | | | | | |
| **Trees >12-In (quanity)** | | | | | | | | | | | | |
| **Fabric (Y/N)** | | | | | | | | | | | | |
| **Dust Control (Y/N)** | | | | | | | | | | | | |
| **Number of Truck Loads Soil Out** | | | | | | | | | | | | |
| **Number of Truck Loads Top Soil Placed** | | | | | | | | | | | | |
| **Number of Truck Loads Gravel -1 Placed** | | | | | | | | | | | | |
| **Number of Truck Loads Gravel -2 Placed** | | | | | | | | | | | | |
| **Number of Other Truck Loads of Material Placed** | | | | | | | | | | | | |
| **Sod (Y/N)** | | | | | | | | | | | | |
| **Seed (Y/N)** | | | | | | | | | | | | |
| **Watering (Y/N)** | | | | | | | | | | | | |

**Other Work:**

**Problems/Delays/Action Items/Misc Comments:**

**End of Shift Status:**

**Site Barriers/Signage Y / N (circle)** **Access(es) Safe Y / N (circle)**

**Equipment Staged/ Secured Properly Y / N (circle)** **Site Cleaned Up Y / N (circle)** **Hand Tools Secured Y / N (circle)**

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# APPENDIX J

## Bunker Hill Mining and Metallurgical Complex
## Operable Unit 3

## Residential Property
## Soil Delivery Request Form

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| RESIDENTIAL PROPERTY<br>SOIL REQUEST FORM | | |
|---|---|---|
| **Property Address (street):** | | |
| **City:** | **Shoshone County** | **State of Idaho** |
| **I am the owner of the residence located at the address shown above. The Idaho Department of Environmental Quality (IDEQ) will deliver a maximum of 11 cubic yards of clean soil to the property address indicated above. This soil is for use at the residences shown in the address above. I understand that it is my responsibility to put the soil in the area or area(s) desired. A copy of the completed form will be retained by IDEQ for inclusion in property files.** | | |

Printed Name: Property Owner

Signature: Property Owner Date

Printed Name: Tenant (if applicable)

Signature: Tenant (if applicable) Date

Mail or otherwise deliver this form to:

Scott Peterson
Idaho Department of Environmental Quality
1005 W. McKinley Blvd.
Kellogg, ID 83837