Sampling and Analysis Plan

Brownfields Hazardous Substances

Phase II Environmental Site Assessment

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**Waste Management & Remediation Division**

**Montana Department of Environmental Quality**

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Acronyms/Abbreviations

| Acronyms/Abbreviations | Definition |
| --- | --- |
| ACM | Asbestos Containing Materials |
| ACBM | Asbestos Containing Building Materials |
| AHERA | Asbestos Hazard Emergency Response Act |
| ARM | Administrative Rules of Montana |
| ASTM | American Society of Testing and Materials |
| CFR | Code of Federal Regulations |
| COPC | Contaminants of Potential Concern |
| DEQ | Montana Department of Environmental Quality |
| DQO | Data Quality Objectives |
| EPA | U.S. Environmental Protection Agency |
| ESA | Environmental Site Assessment |
| HASP | Health and Safety Plan |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| HUD | U.S. Department of Housing and Urban Development |
| IH | Industrial Hygiene |
| LBP | Lead-Based Paint |
| MAP | Model Accreditation Plan |
| mg/kg | Milligrams per kilogram |
| NESHAP | National Emissions Standards for Hazardous Air Pollutants |
| OSHA | Occupational Safety and Health Administration |
| PCB | Polychlorinated Biphenyl |
| PLM | Polarized Light Microscopy |
| PPE | Personal Protective Equipment |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| QA/QC | Quality Assurance / Quality Control |
| SAP | Sampling and Analysis Plan |
| SOP | Standard Operating Procedure |
| SPLP | Synthetic Precipitation Leaching Procedure |
| TCLP | Toxicity Characteristic Leaching Procedure |
| XRF | X-Ray Florescence |

# Introduction

This Sampling and Analysis Plan (SAP) was prepared for the Montana Department of Environmental Quality (DEQ) with funding from a U.S. Environmental Protection Agency (EPA) Brownfields grant for use on all hazardous substance Phase II Environmental Site Assessments (ESA). A programmatic Quality Assurance Project Plan (QAPP) has also been developed by DEQ (DEQ, 2015) that is available under separate cover. In the event of differences between the QAPP and this SAP, the SAP takes precedence.

This SAP has been prepared to guide the sampling associated with a Phase II ESA of the project area described in the attached Site-Specific Planning Worksheet presented in **Appendix A** (the Site). Contaminants of potential concern (COPC) under this SAP include asbestos containing building materials (ACBM), lead based paint (LBP), polychlorinated biphenyls (PCBs) in electrical transformers, mercury containing electrical components, Freon containing appliances, and lead in soil along the exterior drip line.

This SAP is organized as follows: Section 1 presents the introduction, Section 2 presents the project data quality objectives, Section 3 presents the regulatory criteria, Section 4 presents the sampling approach, Section 5 discusses reporting requirements, and Section 6 presents references. **Appendix A** presents a Site-Specific Planning Worksheet and Site Map, **Appendix B** presents the consultant’s Health and Safety Plan (HASP), **Appendix C** presents copies of personnel certifications, **Appendix D** presents a copy of the Sample Data Validation Summary Form, **Appendix E** presents consultant Standard Operating Procedures (SOPs), and **Appendix F** presents selected Laboratory Chain of Custody Forms.

## Key Personnel

This section presents the key personnel directly involved with this project and a description of their roles (**Table 1)**. The DEQ programmatic QAPP presents any additional administrative personnel (DEQ, 2015).

Table 1 - Key Project Personnel

| Title | Entity | Name | Phone/Email | Responsibilities |
| --- | --- | --- | --- | --- |
| Brownfields Coordinator | Montana DEQ | Jason Seyler | (406) 444-6447, [jseyler@mt.gov](mailto:jseyler@mt.gov) | Project decision making, contract management, budgeting, grant management, and reviews all project related deliverables. Other DEQ project managers take on this role depending on caseloads. |
| Consultant Project Manager | Various | | | Coordinates the consultant contract and field activities, prepares project documents, and ensures safety policies are adhered to for field IH staff. The project manager has the ability to stop work if conditions become unsafe. |
| Consultant Quality Assurance (QA) Officer | Various | | | Provides QA during project activities and preparation of documents, reviews analytical data to meet current standards for accuracy and precision. Although employed by the same entity to ensure continuity of institutional knowledge, the Consultant QA Officer is independent of the Project Manager and any data generating activities. |
| Data Validator | Various | | | Evaluates laboratory analytical reports for QA purposes and prepares a data validation summary report. The data validator is not involved in the collection of the sample data. |
| Field Inspectors | Various | | | Conducts inspection activities and reports back to the Project Manager on project status. The field inspector has the ability to stop work if conditions become unsafe. |

## Site Location

This SAP is applicable to all Phase II ESAs for IH related projects in Montana contracted by the DEQ Waste Management & Remediation Division and within the State of Montana. The project location is presented in **Appendix A**.

## Health and Safety

It is the responsibility of the consultant Occupational Health and Safety Coordinator and Project Manager to provide appropriate training to field staff and maintain up-to-date certification and accreditation records. Hard copy and electronic copies of certifications will be maintained by the consultant. Field personnel must maintain current 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) with 8-hour HAZWOPER Annual Refresher certification. Consultant Asbestos Inspectors must maintain current 24-Hour Asbestos Inspector with 4-hour Asbestos Inspector Annual Refresher certification per EPA’s Model Accreditation Plan (MAP), under 40 Code of Federal Regulations (CFR) 763, Subpart E, Appendix C and have current Montana accreditation as an Asbestos Inspector per Administrative Rules of Montana (ARM) 17.74.362- - 368 and *17.74.* A copy of the consultant HASP is presented in **Appendix B**, and copies of field personnel certifications and accreditations are presented in **Appendix C**. Typically, the maximum personal protective equipment (PPE) required for this project is Level C – air purified respirator and chemical resistant clothing (e.g. Tyvek suit), unless site-specific conditions require a greater level of protection.

## Contaminants of Concern

This SAP addresses the following COPCs:

* ACBM in structure building materials,
* LBP on building surfaces and/or as dust,
* Lead in soil along the building drip line,
* Mercury associated with facility fixtures and equipment,
* PCBs associated with facility fixtures and equipment, and
* Freon associated with refrigerants.

## Project Scope of Work and Schedule

This SAP is to be implemented upon final DEQ approval for the following scope of work:

* Perform a room-by-room ACBM assessment by including material type, material category, and material condition as well as evaluate exterior building materials by collecting samples for analysis.
* Perform a room-by-room LBP inspection as well as evaluate exterior building materials by using X-Ray Florescence (XRF).
* If necessary, collect soil samples from along the building drip line for lead analysis.
* Evaluate the buildings to determine if there are mercury containing thermostats, lighting, or other equipment that may present disposal issues.
* Evaluate the buildings to determine if the lighting systems, door dampers, or electrical transformers contain PCBs that may present disposal issues.
* Evaluate the building for appliances that may contain sources of Freon.
* Prepare a Phase II ESA and Cost Estimate Report to document hazardous substances identified at the Site and provide estimated costs for disposal.

## Project Objectives

The objectives of a Phase II ESA are to complete an assessment of the Site’s COPCs to identify materials that may need to be removed or handled appropriately during Site building demolitions or renovations. This includes evaluating whether exterior surfaces containing lead have impacted surface soils and whether the Site building poses a risk of exposure from ACBM, lead, mercury, PCBs, or Freon that could create a health concern for adjacent properties or construction workers.

# project Data Quality Objectives

This section presents the data quality objectives (DQOs) for this Phase II ESA.

## Triad Investigation Approach

The Triad investigation approach is a technical practice supported by EPA to foster modernization of characterizing and remediating contaminated sites (EPA, 2004). The goal of the Triad approach is to manage decision uncertainty and increase confidence that project decisions (about contaminant presence, location, fate, exposure, and risk reduction choices and design) are made correctly and cost-effectively. This approach establishes a foundation for site-related decisions that are both correct and optimized (from a cost-benefit standpoint) using all available historical and current information to estimate:

* Where contamination is (or might be) located;
* How much is (or might be) there;
* How variable concentrations may be and how much spatial patterning may be present;
* What is happening to contaminants as far as fate and migration;
* Who might be exposed to contaminants or harmful degradation products; and
* What might be done to manage risk by mitigating exposure.

The Triad investigation approach will be utilized during this Phase II ESA.

## Quality Assurance/Quality Control

A QAPP (DEQ, 2015) was developed to define project DQOs, guide data acquisition, and data validation activities. Personnel involved with field activities, evaluation of data, and reporting will use the QAPP as a guide for quality assurance and quality control (QA/QC) during the project. QA/QC samples collected and analyzed during cleanup activities may include field duplicates and field blanks.

The consultant will utilize field notebooks, photograph logs, and analytical data to evaluate for completeness and to ensure that applicable standards of care are maintained. Based on this information, if the consultant believes that data is not representative of site conditions then the data may be rejected, and additional sampling may be recommended.

The consultant will perform data validation per DEQ Waste Management and Remediation Division – Data Validation Summary Form (Version 1.3.0, revision date 1/26/18). After this review, a statement will be made to evaluate whether the data supports the DQOs for the project. A copy of the Data Validation Summary Form is presented in **Appendix C**.

### Problem Statement

This SAP covers sampling methodologies that are used during assessment work practices and the data will be used to guide cleanup decisions. Prior to building renovation or demolition, standard redevelopment practice is to conduct an inspection to identify and characterize hazardous substances such as ACBM, LBP, mercury, PCM, and Freon. In some instances, such as where LBP is identified on exterior building materials, soil must also be sampled. Once hazardous substances are identified, an abatement plan must be in place in order ensure that removal and disposal of the hazardous substances is conducted in compliance with state and federal regulations. Where brownfields funding is utilized, this process is required.

A thorough building inspection includes but not limited to walls, ceilings, floors, counters, cabinets, doors and windows, utilities, air ducts, piping runs, insulation, foundations, and surface soil. **Table 2** below, presents a summary of COPC release mechanisms and exposure pathways.

Table 2 - Contaminant Release, Exposure, and Management

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Contaminant | Release Mechanism | Exposure Pathway | Risk Management | Applicable Regulations |
| Asbestos Containing Building Materials (ACBM) | Fugitive asbestos fiber release when damaged. | Inhalation by occupants, construction, or abatement workers | Removal and disposal according to state and federal guidelines | (1) Administrative Rules of Montana (ARM) 17.74.300; (2) Asbestos Hazard Emergency Response Act (AHERA) 40 CFR, Part 763, Subpart E, National Emissions Standards for Hazardous Air Pollutants (NESHAP); as promulgated in Title 40 CFR 763, Subpart M |
| Lead Based Paint (LBP) and Lead in Soil | Leaching, flaking of paint chips | Dermal contact, inhalation, ingestion of solids by occupants, construction, or abatement workers | Removal and disposal according to state and federal guidelines | (1) U.S. Department of Housing and Urban Development (HUD) EPA Title 40 CFR, Part 745 (2) |
| Mercury, polychlorinated biphenyls (PCBs), and Freon | Destruction of building fixtures and equipment | Dermal contact or ingestion by occupants, construction, or abatement workers | Removal and disposal according to state and federal guidelines | (1) Liquid mercury or mercury vapor in components is identified as a characteristic hazardous waste (0009) under 40 CFR.261.24. Mercury-containing fixtures and equipment must be disposed of at a registered hazardous waste facility. Management and disposal of mercury-containing bulbs are regulated under the Resource Conservation and Recovery Act, Universal Waste Rule, and Subtitle C hazardous waste regulations. (2) Transport and disposal of PCBs must comply with 40 CFR 761.62, and applicable Department of Transportation requirements. (3) EPA regulates the emission of Freon gas into the atmosphere through Title VI, Stratospheric Ozone Protection, of the Clean Air Act Amendments of 1990 |

### Decision Statement

Projects include collecting environmental data to support abatement activities for the purpose of renovation or demolition projects. Abatement methods focus on removal of the hazard/s in effort to protect the environment and human health. To assess the feasibility of demolition and/or renovation of each unit, the consultant will evaluate available data and make decisions based on the following decision statements:

* Have an adequate number of samples been collected from each homogeneous material identified in the scope of the project?
* Have the ACBM’s been characterized as Surfacing, Thermal System Insulation (TSI), or Miscellaneous?
* Have ACMB’s been categorized as Regulated Asbestos Containing Material, Category I non-friable material, or Category II non-friable material?
* Have ACBM’s been quantified and identified by location?
* Do concentrations of COPCs meet or exceed regulatory standards or screening levels?
* Do the results indicate that the Site is ready for demolition or renovation, or if hazardous materials are identified that present potential costs of remedial action?
* Are there other areas of the site that may have been contaminated based on historic use or renovations that need to be addressed as a hazard?

Montana’s Asbestos Control Program has asbestos inspection requirements for reporting the findings as listed below and must be captured if the inspection addresses renovations or demolitions within DEQ’s jurisdiction:

* Location of the inspection 17.74.364(6)(a)
* Purpose of the inspection (Renovation and/or demolition) 17.74.364(6)(b)
* Date of the Inspection 17.74.364(6)(c)
* Signature of the accredited inspector 17.74.364(6)(d)
* Inspectors accreditation number and expiration date 17.74.364(6)(e)
* Inventory of all assumed or asbestos containing samples 17.74.364(6)(f)
* All sample location regardless of asbestos content 17.74.364(6)(g)
* Where asbestos is located by type 17.74.364(6)(h)
* Where assumed friable and non-friable is located 17.74.364(6)(i)
* Attached copy of the laboratory report 17.74.364(6)(j)
* Describe necessity to removed ACM prior to reno/demo 17.74.364(6)(k)

### Decision Inputs

Data required to address the decision statements may include the evaluation of physical and chemical characteristics of building materials. The consultant will use data from previous investigations, if available and of acceptable quality, during final recommendations with respect to additional site characterization or cleanup. All data collected and evaluated during inspections will be used to identify discrete or potential areas of contamination that present a potential risk to human health and the environment. Field and/or laboratory analytical results will be compared to applicable state and federal screening levels and standards.

### Study Boundary

The study boundary consists of all building materials located at the Site, and ambient air inside the structure and down-wind of regulated areas. The study area may also include potentially impacted soil surrounding site structures, depending on site history and demolition and abatement work required.

### Decision Rule

Regulatory and industry standards will be used to evaluate asbestos and lead data collected by the consultant. A comparison of site data to state and federal screening levels will be completed to make recommendations for any necessary abatement or soil removal work prior to renovation or demolition activities. For areas where LBP is present, a representative sample of the building material will be collected by combining proportions of the building components which will be analyzed for lead using Toxicity Characteristic Leaching Procedures (TCLP). TCLP is used to determine whether lead concentration in the total waste stream constitutes a characteristic hazardous waste. For areas of the Site where exterior LBP surfaces indicate that lead in soil exists, sampling of soil for total lead may be required to determine future risk of exposure to construction or abatement workers. Where lead in soil is present above DEQ and EPA screening levels, samples will be submitted for TCLP analysis as well as Synthetic Precipitation Leaching Procedure (SPLP) which is used to determine whether lead concentrations present a risk of leaching to groundwater.

### Tolerable Limits of Decision Errors

Decision errors are incorrect conclusions about a site caused by using data that are not representative of site conditions due to identification, sampling, or analytical error. Limits on decision error are typically established to control the effect of sampling and measurement errors on decisions regarding a site, thereby reducing the likelihood that an incorrect decision is made.

Acceptance of decision errors is relevant when decisions will be made based on the collected data and outcome of statistical hypothesis tests performed on the data. The following defines the decision-making problems (EPA 2006):

* Null Hypothesis – Data does not provide sufficient evidence to allow a baseline condition to be rejected in favor of a specified alternative condition (alternative hypothesis);
* False Rejection – Rejection of the null hypothesis due to the limited nature and/or underlying variability of the data collected when the baseline condition should have been accepted.
* False Acceptance – Acceptance of the baseline conditions when in fact, the conditions are false and the null hypothesis should have been rejected.

Using acceptable levels of uncertainty is relevant when the collected data will be used to make conclusions that do not necessarily result in decision-making in situations such as during modeling or estimating population parameters. Estimation problems arise when using the collected data to estimate some unknown population parameter together with a reported measure of uncertainty in the estimate (e.g., standard error or confidence interval). The magnitude of variability will be in absolute or relative terms in relation to the estimate. Uncertainty in the estimate is inevitable. Therefore, a maximum level of uncertainty is generally specified to represent an acceptable level (e.g. Upper Confidence Limit of 90%).

Formal limits on decision error are not necessary in areas where the goal of the assessment is to define the boundaries of known contamination. This SAP identifies specific field and laboratory methods and sampling strategies that reduce sampling error. The total study error will be reduced by collecting an appropriate number of samples deemed necessary. The sampling program is designed to reduce sampling error by specifying an adequate number and distribution of samples to meet project objectives.

### Sampling Design

The sampling design is based on a review of historical information and the redevelopment goals including unencumbered parcels for residential or commercial development. The sample design is presented in Section 4 and will detail the following information:

* Design strategy
* Type and total number of samples anticipated
* Where samples will be collected
* Alternative methods where necessary
* Critical information
* Variability reconciliation

# Regulatory Criteria

This section presents the regulatory criteria regarding the COPCs addressed in this SAP.

## Asbestos

Worker exposure to asbestos during sampling operations including asbestos containing material (ACM) removal is regulated under:

* Title 29 CFR, Part 1926.1101 - Asbestos; Construction Industry Standard; Final Rule, August 24, 2006.
* Title 29CFR, Part 1910.1001, Asbestos; General Industry Standard; Final Rule, August 24, 2006.

The Occupational Safety and Health Administration (OSHA) has established worker protection measures during the removal of asbestos from the facilities including, but not limited to: training and medical monitoring requirements for personnel engaging in the oversight and removal of ACM, exposure limits, respiratory protection, PPE, work practices, engineering controls, and storage of wastes.

The removal and disposal of ACBM is regulated under NESHAP 40 CFR Part 61, Subpart M - National Emission Standard for Asbestos; Final Rule, November 20, 1990, revised June 19, 1995. **Table 3** below presents a summary of pertinent EPA definitions under CFR 763.83, as administered by DEQ.

Table 3 - Summary of Asbestos Definitions

|  |  |
| --- | --- |
| Type | Definition |
| Asbestos-Containing Materials (ACM) | Materials containing more than one percent (1%) asbestos. |
| Asbestos-Containing Building Materials (ACBM) | Surfacing ACBM, thermal system insulation ACBM, or miscellaneous ACBM that is found in or on interior structural members or other parts of a public or commercial building. |
| Assumed Asbestos-Containing Materials | ACM that remains un-sampled, but is considered suspect for asbestos content, and must be treated as ACBM until proven negative for asbestos content by laboratory analysis or by documentation (e.g., product Safety Data Sheet). |
| Friable Asbestos-Containing Materials | Ability of material to be crumbled, pulverized or reduced to powder when dry with hand pressure as determined by physical touching by asbestos building inspector. |

## Lead

### Lead Based Paint

LBP is defined as surface coatings with a lead concentration greater than or equal to 1.0-milligrams per square centimeter or 0.5 percent by weight (40 CFR Part 745). Deteriorated LBP can cause elevated lead levels in dust, flake off to contaminant surrounding soils along the exterior of the building walls if present as an exterior coating, and create exposure risks to building occupants.

The followings items represent the list of regulations associated with the sampling and handling of LBP:

* Title 40 CFR, Part 745, Lead; Requirements for Lead-Based Paint Activities in Target Housing and Child Occupied Facilities; Final Rule, August 29, 1996, revised January 5, 2001.
* Title 24 CFR Part 35 and Title 40, Part 745, Lead; Requirements for Disclosure of Know Lead-Based Paint and/or Lead-Based Paint Hazards in Housing; Final Rule, March 6, 1996.
* Title 40 CFR, Part 260, Hazardous Waste Management System; General; Final Rule, July 1, 2012.
* Title 40 CFR, Part 261, Identification and Listing of Hazardous Waste; Final Rule, July 1, 2012.
* Title 40 CFR, Part 262, Standards Applicable to Generators of Hazardous Waste; Final Rule, July 1, 2012.
* Title 40 CFR, Part 263, Standards Applicable to Transporters of Hazardous Waste; Final Rule, July 1, 2012.
* Title 40 CFR, Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Final Rule, July 1, 2012.
* Title 40CFR, Part 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Final Rule, July 1, 2012.
* Title 40 CFR, Part 268, Land Disposal Restrictions; Final Rule, July 1, 2012.
* Title 29 CFR, Part 1926.62, Occupational Health and Environmental Controls, Final Rule May 4, 1993, revised March 26, 2012
* Housing and Community Development Act, Residential Lead-Based Paint Hazard Reduction Act, Title X, 1992.
* HUD, Guidelines for the Control of Lead-Based Paint Hazards in Housing, June 1995, revised 1997 and 2000.

Worker exposure to lead hazards in construction is regulated under CFR 29.1926.62. OSHA has established provisions for worker protection including, but not limited to training and medical monitoring requirements for personnel engaging in the oversight and removal of LBP, exposure limits, respiratory protection, PPE, work practices, engineering controls, and storage of wastes.

The handling storage, transport, and disposal of lead or lead-contaminated waste must be conducted in accordance with 40 CFR 260-265, and building owners must comply with land disposal restriction notification requirements as required by 40 CFR 268. For disposal purposes, under 40 CFR 261.24, lead hazardous waste is defined as products that have test results above 0.5 milligrams per liter of lead in the TCLP extract.

Contractor will ensure that all lead-based paint activities are completed in accordance with [eCFR :: 40 CFR Part 745 Subpart L -- Lead-Based Paint Activities](https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-745/subpart-L) and that the appropriate certified personnel are present on-site.

### Lead in Soil

Composite soil samples will be submitted for laboratory analysis of total lead in soil which will be compared with the EPA’s generic leaching to groundwater screening level of 140 milligrams per kilogram (mg/kg) (EPA, 2018) and the DEQ residential direct contact risk screening level of 200 mg/kg (DEQ, 2018). Samples will be sieved at the laboratory prior to analysis. At a minimum, the frequency of total lead sampling in soil shall follow DEQ guidelines for one composite sample per 625 square feet of exposed soil; however, the consultant may elect to sample at a higher frequency based upon where the LBP is observed on external building surfaces and the building demolition plans. TCLP and/or SPLP analysis will be performed for the purpose of soil disposal during Site demolition and evaluating the risk of leaching to groundwater, if necessary.

## Mercury, PCB, and Freon

### Mercury

Free (liquid) mercury or mercury vapor in components can be a source of mercury leaching into the environment and is identified as a characteristic hazardous waste (0009) under 40 CFR.261.24. Based on the identification as a hazardous waste, mercury-containing fixtures and equipment must be disposed of at a registered hazardous waste facility.

Management and disposal by businesses of fluorescent light bulbs and other mercury-containing bulbs are regulated under the Resource Conservation and Recovery Act, Universal Waste Rule, and Subtitle C hazardous waste regulations.

### PCBs

PCBs in ballasts and electrical components can be a dermal hazard and a source of PCBs leaching into the soil. Transport and disposal of PCBs must comply with 40 CFR 761.62, and must comply with applicable Department of Transportation requirements.

### Freon

Freon gas includes a number of gaseous, colorless chlorofluorocarbons that are commonly used as refrigerants. The EPA regulates the emission of Freon gas into the atmosphere due to its ozone depleting capabilities. Through Title VI, Stratospheric Ozone Protection, of the Clean Air Act Amendments of 1990, the EPA regulates Freon gas and requires mandatory recycling and a ban on the intentional venting or releasing of refrigerants.

# Sampling Approach

This section presents the applicable sampling methodologies for the hazardous substances identified in Table 2, Section 2.2.1. The following SOPs will be followed and are presented in **Appendix E**:

* Asbestos Inspections
* LBP Inspections
* Mercury visual inspections
* PCB visual inspections

Field personnel will mobilize out of Consultant offices in Helena and Billings, Montana, with the necessary equipment to complete sampling tasks. Consultant SOPs for soil sampling and sample handling are on file with DEQ.

## Asbestos Sampling

Suspected ACMs are grouped as homogeneous materials that are uniform in appearance, age, color and texture. If the inspector decides that a material is not similar in appearance, age, color, and texture to other materials in the building, then the inspector will distinguish the material as a unique material and create identification for that material. Bulk samples are collected in air tight plastic bags, and sealed immediately upon collection, and labeled with a unique sample number. Sampling instruments are wiped clean with moist towelettes after the collection of each sample to prevent cross-contamination between samples. A unique sample identification number is assigned to each sample that includes a reference to the project such as project number, date collected, homogeneous code, and sequence.

Upon completion of sampling activities, the bulk samples will be delivered, along with completed and signed chain-of-custody documentation, to a laboratory accredited by the National Voluntary Laboratory Accreditation Program (NAVLAP) for bulk asbestos sample analysis. Bulk asbestos sample analysis will be performed using polarized light microscopy (PLM) in accordance with the EPA Interim Method 600/R-93/116, for identification of mineral forms of asbestos. The quantification of asbestos in the sample is a visual estimate only. Samples reported at 1% or less but greater than zero must be point counted as described in the analytical method. The limit of detection for this method is 1 percent by volume. A copy of the selected laboratory chain-of-custody form is presented in **Appendix E**.

### Surfacing Material

In a statistically random manor that is representative of the homogeneous material, collect the required number of samples as described in AHERA 763.86(a).

Table 4 - Friable Surfacing Material Sampling Protocols

|  |  |
| --- | --- |
| Surface Area | No. of Samples |
| 1,000 square feet or less | Three bulk samples |
| 1,000 to 5,000 square feet | Five bulk samples |
| Over 5,000 square feet | Seven bulk samples |

### Thermal System Insulation

Thermal system insulation will be sampled in a randomly distributed manner that is representative of the homogeneous material, with at least three bulk samples collected from each homogeneous material. At least one bulk sample will be collected from each homogeneous material of patched thermal system insulation that is less than six feet and was not assumed to be ACBM as described in AHERA 763.86(b).

Bulk samples will also be collected from each insulated mechanical system where cement or plaster, or similar hard pack materials used on fittings, such as tees, elbows, or valves are to be treated as separate homogeneous materials, based on similar appearance, age, color, and texture.

Bulk samples will not be collected from any homogeneous material where the inspector determined that the thermal system insulation is fiberglass, foam glass, rubber, or other non-asbestos containing building material. Inspectors are encouraged to use professional judgement when considering the above listed materials regarding adhesives, mastics, and glues that may be associated with the materials.

### Miscellaneous Material

Three randomly selected bulk samples are to be collected from each homogeneous material as described in AHERA 763.86(c).

## Lead Sampling

### Lead Based Paint

LBP inspections include documenting types of painted building components and substrate materials. Typical building components tests include walls, door units, window units, ceilings and structural members. Substrate materials typically consisted of metal and concrete. Building components are cataloged based on location, specific component type, and substrate material. The EPA and HUD define a lead inspection as a surface-by-surface investigation to determine the presence of LBP per HUD LBP inspection guidelines. The consultant will use field XRF methodology to determine the presence or absence of LBP as XRF is identified as the recommended method to determine lead in paint (HUD, 2000). For these inspections, field personnel typically utilize a Spectrum Analyzer XRF, which automatically calculates measurable amounts of lead in paint by correcting for substrate conditions.

### Lead Waste Characterization for Disposal

The consultant will collect one representative composite sample of lead containing building components per American Society for Testing and Materials (ASTM) Method E1908-10. The samples will be transported under standard chain of custody protocol to a DEQ approved laboratory for TCLP lead analysis. The tests will be conducted in accordance with SW846 “Test Methods for Evaluating Solid Waste,” 3rd Edition, updates I, II, IIA. IIB, III, which will determine the classification status of the materials; the lead concentration of materials disposed of in Class II landfills may not exceed 5 milligrams per liter when tested using the TCLP method.

### Lead in Soil

If LBP is observed on external building surfaces then samples will be collected for XRF analysis from beneath the building drip line in 1-foot increments to determine the appropriate sample distance from the building. Samples will be placed in Ziplock baggies for XRF screening. Sample distances exhibiting the highest reading will then be selected for further testing. Five-point composite surface soil samples from alongside the building drip line will be collected at the appropriate distance. At least one composite sample will be collected from each side of the building at a frequency of 1 per 625 square feet of exposed soil. Sub-samples will be transferred to a decontaminated stainless-steel container and spade and mixed until soil consistency becomes homogenous. Each composite sample will be placed in a labeled laboratory supplied container and submitted for laboratory analysis of total lead by EPA method 6020 which includes using soil that passes through a No. 100 mesh sieve. Per consultation with DEQ, if samples exceed the leaching to groundwater screening level of 140 mg/kg (EPA, 2018) the samples will be analyzed by the SPLP (method is SW846-1312) for potential for leaching to groundwater. If laboratory results exceed the direct contact screening level of 200 mg/kg than soil samples will be further analyzed by the TCLP (EPA method is SW846-1311) to characterize the material for disposal.

## Mercury, PCB’s, and Freon

### Mercury

Mercury has properties that have led to its use in many different products. It conducts electricity, forms alloys with other metals, and expands in response to changes in temperature and pressure. While some manufacturers have reduced or eliminated their use of mercury in products, there are still many existing items in the marketplace that contain mercury.

An experienced IH technician will visually evaluate the buildings to determine if there are visible signs of mercury-containing light fixtures, thermostats, batteries or other equipment. No samples will be collected under this SAP. The purpose of this assessment is to provide recommendations for removal and disposal of mercury-containing equipment, if necessary.

### PCB’s

PCBs are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties ranging from oily liquids to waxy solids. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper and many other applications.

The Site will be evaluated to determine if the presence of PCB-containing equipment such as lighting systems, door dampers, electrical transformers, and/or generators. Visual observations of fluorescent light fixtures in the facility will be made to collect data on the ballasts which can be compared to manufacturer information on known PCB-containing equipment. No samples will be collected for PCBs under this SAP. The purpose of this assessment is to provide recommendations for removal and disposal of PCB-containing equipment, if necessary.

### Freon

Freon gas includes a number of gaseous, colorless chlorofluorocarbons that are commonly used as refrigerants. Consultant will visually evaluate the building to determine if there are visible signs of Freon containing equipment. The evaluation will document the estimated number of presumed Freon containing equipment. The location of suspected Freon equipment will be recorded on a drawing.

## Field QA

### Asbestos Sampling

The number of asbestos field duplicates should achieve 5% sampling ratio, or 1 duplicate per 20 natural samples.

### Lead-Based Paint Sampling

During the evaluation for LBP, the inspector will carry a test strip with a known quantity of lead in parts per million. The inspector will take at least three calibration check readings prior to the commencement of the lead-based paint inspection. These calibration check readings should be repeated every four hours, every time the XRF is turned on, or at the end of the sampling job, whichever is more frequent. The XRF is also sent to the manufacturer for annual calibration or when test strip results indicate impaired accuracy, whichever comes first.

The XRF calibration check readings are then taken on the red 1.02 mg/cm2 Standard Reference Material paint film, developed by the National Institute of Standards and Technology. The red film is placed on top of a 12-inch piece of Styrofoam or some other lead-free material as recommended by the manufacturer before taking readings. Each time calibration check readings are made, three nominal-time readings are taken on the red film and the results recorded. The average of the three calibration check readings is also recorded.

Large differences of calibration check reading averages from 1.02 mg/cm2 may alert the inspector to problems in the instrument's performance. The calibration check reading averages should not differ from 1.02 mg/cm2 by more than the calibration check tolerance specified in the XRF Performance Characteristics Sheet for the specific instrument used. If the observed calibration check average minus 1.02 mg/cm2 is greater than the calibration check tolerance, the instructions provided by the manufacturer should be followed in order to bring the instrument back into control before any more XRF testing is done. All readings taken by the suspended instrument since the last successful calibration check test should be repeated.

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# Reporting

At the completion of this Phase II ESA the consultant will prepare a Phase II ESA and Cost Estimate Report that summarizes the findings of the hazardous substance investigation with a summary of methods, any deviations from this SAP, analytical results, conclusions, and recommendations for further action, if needed. If further action is needed such as abatement work a detailed cost estimate will be prepared. The report will contain any relevant tables, figures, and attachments including field notes, photographs, laboratory analytical reports, data validation reports, and any other pertinent information.

# References

Montana Department of Environmental Quality (DEQ), 2015. *Quality Assurance Program Plan for Environmental Data Operations for the Montana Department of Environmental Quality’s Brownfields Program, Revision 0.0. Helena, MT.*

Montana Department of Environmental Quality (DEQ), 2018. *Surface and Subsurface Soil Screening Flowchart, Parts 1 and 2. Helena, MT.*

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U.S. Environmental Protection Agency (EPA), 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4. Office of Environmental Information. EPA/240/B-06-001.*

U.*S.* Environmental Protection Agency (EPA), 2018. *Regional Screening Levels - Generic Tables. November [*[*https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables*](https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables)*]*

U.S. Department of Housing and Urban Development (HUD). 2000. *Guidelines for the Control of Lead-Based Paint Hazards in Housing, June 1995, revised 1997 and 2000.*

Appendix A – Site-Specific Planning Worksheet and SIte Map

**BROWNFIELDS HAZARDOUS SUBTANCE PHASE II ESA**

**MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

|  |
| --- |
| **Site Name:** |
| **Location:** |
| **Legal Description:** |
| **Owner:** |
| **Contaminants of Concern:** |
| **Redevelopment Action (Demolition or Renovation):** |
| **Anticipated Cleanup Schedule:** |
| **Consultant Name and Address:** |
| **Site Background / Reuse Plan:** |
| **Scope Items:** |

Authorizing Signatures:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | |  |  | |
| **Consultant Project Manager** | **Date** |  |  |  |
|  | | | | |
|  | |  |  | |
| **Consultant QA Officer** | **Date** |  |  |  |

*Attachments: Site Map*

Appendix B – Consultant Health and Safety Plan

Appendix C – Personnel Certifications

Appendix D – Sample data validation summary form

Appendix E – standard operating procedures

Appendix F – laboratory chain of custody forms