Libby Superfund Site Operable Unit 3 Standard Operating Procedure

Date: September 26, 2007

OU3 SOP 7 (Rev. 0)

Title: EQUIPMENT DECONTAMINATION

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Remedial Project Manager		9/26/07
SOP Author		9/26/07

Revision Number	Date	Reason for Revision
0	09/26/2007	--

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) is based on MWH SOP-02, Equipment Decontamination, Revision 1.0, March 2004, modified for use at the Libby Asbestos Superfund Site OU3. Decontamination of drilling, sampling, and monitoring equipment is a necessary and critical aspect of environmental field investigations. Proper decontamination is a key element in reducing the potential for cross-contamination between samples from different locations, as well as ensuring that samples are representative of the sampled materials. Improper decontamination may result in costly re-collection and re-analysis of samples. All equipment used in the sampling process will be properly decontaminated prior to the collection of each sample and after completion of sampling activities.

The procedures outlined in this SOP will be followed during decontamination of field equipment used in the sampling process, including drilling, soil/water sample collection, and monitoring activities. Any deviations from these procedures will be noted in the field notebooks and approved by the appropriate oversight agency, if significant. Three major categories of field equipment, along with applicable decontamination methods for each, are discussed below.

2.0 HEALTH AND SAFETY WARNING

All personnel engaged in equipment decontamination must follow health and safety protocols described in the health and safety plan. Asbestos fibers are thin and long fibers so small that they cannot be seen by the naked eye. Asbestos fibers are easily inhaled when disturbed and when embedded in the lung tissue can cause health problems. Significant exposure to asbestos increases the risk of lung cancer, mesothelioma, asbestosis (non-cancerous lung disease), and other respiratory diseases (ATSDR 2006).

3.0 DEFINITIONS

Bailer: A cylindrical tool designed to remove material from a well. A valve at the bottom of the bailer retains the contents in the bailer.

Bladder Pump: Groundwater sampling equipment consisting of a flexible bladder, usually made of Teflon®, contained within a rigid cylindrical body (commonly made of stainless steel). The lower end of the bladder is connected to the intake port through a check valve, while the upper end is connected through a second check valve to a sampling line that leads to the ground surface.

Brass Sleeve: Hollow, cylindrical sleeves made of brass and used as liners in split-spoon samplers for collection of undisturbed samples.

Auger Flight: An individual auger section, usually 5 feet in length.

Continuous Core Barrel: 3-5 foot long steel barrels that can be joined together to allow continuous cores to be collected during a single run.

Drill Pipe: Hollow metal pipe used for drilling, through which soil and groundwater sampling devices can be advanced for sample collection.

Peristaltic Pump: A low-volume suction pump. The compression of a flexible tube by a rotor results in the development of suction.

Source Water: A drilling quality water source identified to be used for steam cleaning. This source should be sampled at the beginning of each field program to set baseline concentrations.

Distilled Water: Commercially available water that has been distilled. Each batch of distilled water should be analyzed to set baseline concentrations.

Hand Auger: A sampling tool consisting of a metal tube with two sharpened spiral wings at the tip.

Split-Spoon Sampler: A sampling tool consisting of a thick-walled steel tube with a removable head and drive shoe. The steel tube splits open lengthwise when the head and drive shoe are removed.

Scoop: A sampling hand tool consisting of a small shovel- or trowel-shaped blade.

Submersible Pump: Groundwater sampling pump that consists of a rotor contained within a chamber and driven by an electric motor.

4.0 RESPONSIBILITIES

This section presents a brief definition of field roles, and the responsibilities generally associated with them. This list is not intended to be comprehensive and often, additional personnel may be involved. Project team member information will be included in project-specific plans (e.g., work plan, field sampling plan, quality assurance plan, etc.), and field personnel will always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

Project Manager: Responsible for project implementation and coordination, selects project-specific drilling and sampling methods, and associated decontamination procedures with input from other key project staff, and appropriate oversight agencies.

Quality Control Manager: Overall management and responsibility for quality assurance and quality control (QA/QC). Selects QA/QC procedures for the sampling and analytical methods, performs project audits, and ensures that data quality objectives are fulfilled.

Field Team Leader (FTL) and/or Geologist, Hydrogeologist, or Engineer: Implements the field program and supervises other sampling personnel, and ensures that SOPs are properly followed. Prepares daily logs of field activities.

Field Sampling Technician (or other designated personnel): Assists the FTL, geologist, hydrogeologist, or engineer in the implementation of tasks and is responsible for the decontamination of sampling equipment.

5.0 DECONTAMINATION PROCEDURES

Drilling and sampling procedures require that decontaminated tools be employed in order to prevent cross-contamination. The decontamination procedures described below will be followed to ensure that only uncontaminated materials will be introduced to the subsurface during drilling and sampling. The equipment decontamination process will be undertaken before and after each use of the equipment and include either steam cleaning or washing. Steam cleaning of equipment, if used, will be performed at a temporary decontamination site. The flooring of the temporary decontamination site will be impermeable to water and large enough to contain the equipment and the rinsate produced.

If the quantity of water in the pad area exceeds its holding capacity, the water will be drummed temporarily until analytical results are obtained and the water can be properly disposed of. Steam cleaning will not be performed over bare ground, but will always be conducted so that rinsate can be collected and disposed of properly. Wherever applicable, equipment will be disassembled to permit adequate cleaning of the internal portions.

5.1 Drilling and Large Equipment

The following procedure will be used for decontamination of large pieces of equipment. These include well casings, auger flights, drill pipes and rods, and those portions of the drill rig that may stand directly over a boring or well location, or that may come into contact with casing, auger flights, pipes, or rods.

- Establish a decontamination area large enough to contain the equipment and any decontamination waste
- Place equipment on sawhorse or equivalent, if possible.

- Steam clean the external surfaces and internal surfaces, as applicable, on equipment using high-pressure steam cleaner from an approved water source. If necessary, scrub using brushes and a phosphate-free detergent (e.g., Alconox™), or equivalent laboratory-grade detergent until all visible dirt, grime, grease, oil, loose paint, rust, etc., have been removed.

- Rinse with potable water

- Remove equipment from decontamination pad and allow to air dry

- Record date and time of equipment decontamination

5.2 Soil and Groundwater Sampling Equipment

The following procedure will be used to decontaminate sampling equipment such as split-spoon samplers; brass sleeves; continuous core barrels; scoops; hand augers; non-dedicated bailers; submersible pumps, bladder pumps; and other sampling equipment that may come into contact with samples. To minimize decontamination procedures in the field, dedicated equipment will be used wherever feasible:

- Wash and scrub equipment with phosphate-free, laboratory-grade detergent (e.g., Alconox™ or equivalent) and off-site distilled water

- Triple-rinse with distilled water

- Air dry

- Wrap in aluminum foil, or store in clean plastic bag or designated casing.

- Record date and time of equipment decontamination

Personnel involved in decontamination activities will wear appropriate protective clothing as defined in the project-specific health and safety plan.

5.3 Monitoring Equipment

The following procedure will be used to decontaminate monitoring devices such as slug-test equipment, groundwater elevation and free product thickness measuring devices, and water quality checking instruments. Note that organic solvents can not be used to decontaminate free product measuring devices because they will cause damage to the probes. Spray bottles may be used to store and dispense distilled water.

- Wash equipment with laboratory-grade, phosphate-free detergent (e.g., Alconox™ or equivalent) and distilled water
- Triple-rinse with distilled water
- Store in clean plastic bag or storage case.
- Record date and time of equipment decontamination

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

All equipment decontamination must be documented in the field logbooks and/or field forms, including rationales deviations from this SOP. The Field Team Leader or designated QA reviewer will check and verify that field documentation has been completed per this procedure and other procedures referenced herein.

To assess the adequacy of decontamination procedures, field rinsate blanks may be collected. The specific number of rinsate blanks will be defined in a FSP or work plan or by the Project

Manager. In general, at least one field rinsate blank should collected per sampling event or per day.

Rinsate blanks with elevated or detected contaminates will be evaluated by the Project Manager, who will relay the results to the site workers. Such results may be indicative of inadequate decontamination procedures that require corrective actions (e.g., retaining).

7.0 PROCEDURE FOR WASTE DISPOSAL

All decontamination water that has come into contact with contaminated equipment will be handled, labeled, stored and disposed according to SOP 12. Unless otherwise specified in the FSP, waste generated from other sources and classified as non-hazardous waste (e.g., PPE, pastic sheeting, rope and misc. debris) will be disposed into trash receptacles.

8.0 REFERENCES

Agency for Toxic Substances and Disease Registry. 2006. *Asbestos Exposure and Your Health*.

U.S. Environmental Protection Agency, *RCRA Ground-Water Monitoring: Draft Technical Guidance*, November 1992. Page 7-17.

Libby Superfund Site Operable Unit 3 Standard Operating Procedure

Date: September 26, 2007

OU3 SOP 8 (Rev. 0)

Title: SAMPLE HANDLING AND SHIPPING

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Remedial Project Manager		9/26/07
SOP Author		9/26/07

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1.0 INTRODUCTION

This standard operating procedure (SOP) is based on MWH SOP-09, Sample Handling and Shipping, Revision 1.0, March 2004, modified for use at the Libby Asbestos Superfund Site OU3. This SOP describes the requirements for sample handling, storage and shipping. The purpose of this SOP is to define sample management activities as performed from the time of sample collection to the time they are received by the laboratory.

2.0 HEALTH AND SAFETY WARNING

All personnel engaged in soil sampling must follow health and safety protocols described in the health and safety plan. Asbestos fibers are thin and long fibers so small that they cannot be seen by the naked eye. Asbestos fibers are easily inhaled when disturbed and when embedded in the lung tissue can cause health problems. Significant exposure to asbestos increases the risk of lung cancer, mesothelioma, asbestosis (non-cancerous lung disease), and other respiratory diseases (ATSDR 2006).

3.0 DEFINITIONS

Chain-of-Custody: An accurate written record of the possession of each sample from the time of collection in the field to the time the sample is received by the designated analytical laboratory.

Sample: Physical evidence collected for environmental measuring and monitoring. For the purposes of this SOP, sample is restricted to solid, aqueous, air, or waste matrices. This SOP does not cover samples collected for lithologic description nor does it include remote sensing imagery or photographs (refer to SOP-9 for field documentation procedures).

Sampler: The individual who collects environmental samples during fieldwork.

4.0 RESPONSIBILITIES

This section presents a brief definition of field roles, and the responsibilities generally associated with them. This list is not intended to be comprehensive and often additional personnel may be involved. Project team member information will be included in project-specific plans (e.g., work plan, field sampling plan (FSP), quality assurance plan, and etc.), and field personnel will always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

Project Manager: The Project Manager is responsible for ensuring that the requirements for sample management are included in the appropriate project plans. The Project Manager is responsible for coordinating sample management efforts with input from other key project staff and applicable government agencies.

Quality Control Manager: Overall management and responsibility for quality assurance and quality control (QA/QC). Selects QA/QC procedures for the sampling and analytical methods, performs project audits, and ensures that data quality objectives are fulfilled.

Field Team Leader and/or Field Hydrogeologist, Geologist or Engineer: Implements the sampling program, supervises other sampling personnel, and ensures compliance with SOPs and QA/QC requirements. Prepares daily logs of field activities.

Field Technician: Responsible for sample collection, documentation, packaging, and shipping. Assists the FTL and/or geologist, hydrogeologist, or engineer in the implementation of tasks.

5.0 PROCEDURES

5.1 Applicability

The information in this SOP may be used by direct reference or incorporated into project-specific plans. Deviations or modifications to procedures addressed herein must be brought to the attention of, and approved by, applicable government agencies.

5.2 Sample Management

Sample Containers: The sample containers to be used will be dependent on the sample matrix and analyses desired, and are specified in the project FSP. Only certified pre-cleaned sample containers will be used. Sample containers will be filled with adequate headspace (approximately 10 percent) for safe handling upon opening, except containers for volatile organic compound (VOC) analyses, which will be filled completely with no headspace. This no-headspace requirement applies to both soil and groundwater samples.

Once opened, the containers will be used immediately. If the container is used for any reason in the field (e.g., screening) and not sent to the laboratory for analysis, it will be discarded. Prior to discarding the contents of the used container and the container, disposal requirements will be evaluated. When storing before and after sampling, the containers will remain separate from solvents and other volatile organic materials. Sample containers with preservatives added by the laboratory will not be used if held for an extended period on the job site or exposed to extreme heat conditions. Containers will be kept in a cool, dry place. For preserved samples (except VOCs), the pH of the sample will be checked following collection of the sample. If the pH is not at the required level, additional preservative (provided by the laboratory) will be added to the sample container.

Numbering and Labeling: Refer to OU3 SOP-9.

Custody Seals. Custody seals with the date and initials of the sampler will be used on each shipping container to ensure custody. The custody seal will be placed on opposites sides of the cooler across the seam of the lid and the cooler body. Alternatively, if the sample containers are all placed inside a liner bag within the cooler, the custody seal may be placed across the seal of the liner bag inside of the cooler.

Chain-of-Custody: COC procedures require a written record of the possession of individual samples from the time of collection through laboratory analyses. A sample is considered to be in custody if it is:

- In a person's possession
- In view after being in physical possession
- In a secured condition after having been in physical custody
- In a designated secure area, restricted to authorized personnel

The COC record will be used to document the samples taken and the analyses requested. Refer to SOP-9 Attachment 2 for the OU3-specific COC form. Information recorded by field personnel on the COC record will include the following:

- Sample identifier (Index ID)
- Date and time of collection
- Sample matrix
- Preservation
- Type of analyses requested
- Unique COC number
- Lab being shipped to
- Signature of individuals involved in custody transfer (including date and time of transfer)
- Airbill number (if appropriate)
- Any comments regarding individual samples (e.g., organic vapor meter readings, special instructions).

COC records will be placed in a waterproof plastic bag (e.g., Ziploc®), taped to the inside lid of the cooler or placed at the top of the cooler, and transported with the samples. Signed airbills will serve as evidence of custody transfer between the field sampler and courier, as well as between the courier and laboratory. If a carrier service is used to ship the samples (e.g., Federal Express, etc.), custody will remain with the courier until it is relinquished to the laboratory. Upon receiving the sample cooler, a laboratory representative should sign in the receiving box of the COC, thus establishing custody. The sampler will retain copies of the COC record and airbill.

Sample Preservation/Storage: The requirements for sample preservation are dependent on the desired analyses and the sample matrix, and are specified in the FSP.

5.3 Sample Shipping

The methods and procedures described in this SOP were developed from these sources:

- 49 CFR 173. Shippers – Shippers – General Requirements for Shipping. United States Code of Federal Regulations available online at http://www.gpoaccess.gov/cfr/index.html

- 49 CFR 178. Specifications for Packaging. United States Code of Federal Regulations available online at http://www.gpoaccess.gov/cfr/index.html

- ASTM D 4220. Standard Practice for Preserving and Transporting Soil Samples. American Society for Testing and Materials available online at http://www.astm.org/

- ASTM D 4840. Standard Practice for Sampling Chain-of-Custody Procedures. American Society for Testing and Materials available online at http://www.astm.org/

Procedures for packaging and transporting samples to the laboratory are dependent on the chemical, physical, and hazard properties of the material. The procedures may also be based on an estimation of contaminant concentrations/properties in the samples to be shipped. Samples will be identified as environmental samples, excepted quantities samples, limited quantities samples, or standard hazardous materials. Environmental samples are defined as solid or liquid samples collected for chemical or geotechnical analysis. Excepted quantities involve the shipment of a few milliliters of either an acid or base preservative in an otherwise empty sample container. Limited quantities are restricted amounts of hazardous materials that may be shipped in generic, sturdy containers. Standard hazardous material shipments require the use of stamped/certified containers. All samples will be packaged and shipped or hand delivered to the laboratories the same day of sample collection, unless otherwise specified in the project-specific FSPs.

The following paragraphs describe standard shipping procedures for different types of samples. Any exceptions to these procedures will be defined in the FSP. It is the responsibility of the sampler to refer to the U.S. Department of Transportation (DOT) (http://hazmat.dot.gov/regs/rules.htm) regulations when dealing with a substance not addressed in this SOP for requirements and limitations associated with the shipment.

Sample Shipping via Commercial Carrier:

Aqueous or Solid Samples: Samples will be packaged and shipped to the laboratories the same day of sample collection, unless otherwise specified in the FSP and depending on holding time requirements for individual samples. For aqueous or solid samples that are shipped to the laboratory via a commercial carrier the following procedures apply:

- Sample labels will be completed and attached to sample containers.
- The samples will be placed upright in a waterproof metal (or equivalent strength plastic) ice chest or cooler.
- For shipments containing samples for volatile organic analysis, include a trip blank.
- Ice in double Ziploc® bags (to prevent leakage) will be placed around, among, and on top of the sample bottles. Enough ice will be used so that the samples will be chilled and maintained at 4°C ± 2°C during transport to the laboratory. Dry ice or blue ice will not be used.
- To prevent the sample containers from shifting inside the cooler, the remaining space in the cooler will be filled with inert cushioning material, such as shipping peanuts, additional bubble pack, or cardboard dividers, such that the sample containers remain upright and do not break.
- Tape shut the cooler's drain plug
- The original copy of the completed COC form will be placed in a waterproof plastic bag and taped to the inside of the cooler lid or placed at the top of the cooler.
- The lid will be secured by wrapping strapping tape completely around the cooler in two locations.

- Mark the cooler with arrow labels indicating the proper upright position of the cooler.

- Custody seals consisting of security tape with the date and initials of the sampler will be used on each shipping container to ensure custody. Two signed custody seals will be placed on the cooler, one on the front and one on the back.

- A copy of the COC record and the signed air bill will be retained for the project files.

- Affix a label containing the name and address of the shipper to the outside of the cooler

Hand-Delivered Samples: For aqueous or solid samples that will be hand carried to the laboratory, the same procedures apply.

Excepted Quantities: Usually, corrosive preservatives (e.g., hydrochloric acid, sulfuric acid, nitric acid, or sodium hydroxide) are added to otherwise empty sample bottles by the analytical laboratory prior to shipment to field sites. However, if there is an occasion whereby personnel are required to ship bottles with these undiluted acids or bases, the containers will be shipped in the following manner:

1. Each individual sample container will have not more than 30 milliliters of preservative.

2. Collectively, the preservative in these individual containers will not exceed a volume of 500 milliliters in the same outer box or package.
3. Despite the small quantities, only chemically compatible material may be placed in the same outer box, (e.g., sodium hydroxide, a base, must be packaged separately from the acids).

4. Federal Express will transport nitric acid only in concentrations of 40 percent or less.

5. A "Dangerous Goods in Excepted Quantities" label will be affixed to the outside of the outer box or container. Information required on the label includes:

   - Signature of Shipper
   - Title of Shipper
   - Date
   - Name and Address of Shipper
   - Check of Applicable Hazard Class
   - Listing of UN Numbers for Materials in Hazard Classes

Limited Quantities: Occasionally, it may become necessary to ship known hazardous materials, such as pure or floating product. DOT regulations permit the shipment of many hazardous materials in "sturdy" packages, such as an ice chest or cardboard box (not a specially constructed and certified container), provided the following conditions are met:

1. Each sample bottle is placed in a plastic bag, and the bag is sealed. Each VOC vial will be placed in a sealable bag. As much air as possible is squeezed from the bag before sealing. Bags may be sealed with evidence tape for additional security.

2. Or each bottle is placed in a separate paint can, the paint can is filled with vermiculite, and the lid is affixed to the can. The lid must be sealed with metal clips, filament, or evidence tape. If clips are used, the manufacturer typically recommends six clips.

3. The cans are placed upright in a cooler that has had the drain plug taped shut inside and outside, and the cooler is lined with a large plastic bag. Approximately 1 inch of adsorbent material sufficient to retain any liquid that may be spilled, is placed in the bottom of the liner. Only containers having chemically compatible material may be packaged in each cooler or other outer container.

4. The COC record is sealed inside a plastic bag and placed inside the cooler. The sampler retains one copy of the COC record. The laboratory will be notified if the

sample is suspected of containing any substance for which the laboratory personnel should take safety precautions.

5. The cooler is shut and sealed with strapping tape (filament type) around both ends. Two signed custody seals will be placed on the cooler, one on the front and one on the back. Additional seals may be used if the sampler and/or shipper consider more seals to be necessary. Wide, clear tape will be placed over the seals to ensure against accidental breakage.

6. The following markings are placed on the side of the cooler:

   - Proper Shipping Name (Column B, List of Dangerous Goods, Section 4, IATA Dangerous Goods Regulations [DGR])
   - UN Number (Column A, List of Dangerous Goods, Section 4, IATA DGR)
   - Shipper's name and address
   - Consignee's name and address
   - The words "LIMITED QUANTITY"
   - Hazard Labels (Column E, List of Dangerous Goods, Section 4, IATA DGR)
   - Two Orientation (Arrow) labels placed on opposite sides.

7. The Airbill/Declaration of Dangerous Goods form is completed as follows:

   - Shipper's name and address
   - Consignee's name and address
   - Services, Delivery & Special Handling Instructions
   - Cross out "Cargo Aircraft Only" in the Transport Details Box
   - Cross out "Radioactive" under Shipment Type
   - Nature and Quantity of Dangerous Goods

- Proper Shipping Name (Column B, List of Dangerous Goods, Section 4, IATA DGR)
- Class or Division (Column C, List of Dangerous Goods, Section 4, IATA DGR)
- UN Number (Column A, List of Dangerous Goods, Section 4, IATA DGR)
- Packing Group (Column F, List of Dangerous Goods, Section 4, IATA DGR)
- Subsidiary Risk, if any (Column D, List of Dangerous Goods, Section 4, IATA DGR)
- Quantity and type of packing (number and type of containers: for example, "3 plastic boxes", and the quantity per container, "2 L", is noted as "3 Plastic boxes X 2 L" This refers to 3 plastic boxes (coolers are referred to as plastic boxes) with 2 liters in each box.
- Packing Instructions (Column G, List of Dangerous Goods, Section 4, IATA DGR).
- Note: Only those Packing Instructions in Column G that begin with the letter "Y" may be used. These refer specifically to the Limited Quantity provisions.
- Authorization (Write in the words Limited Quantity)
- Emergency Telephone Number (List 800-535-5053. This is the number for INFOTRAC.)
- Printed Name and Title, Place and Date, Signature.

Standard Hazardous Materials: Shipment of standard hazardous materials presents the most difficulty and expense. However, there may be occasion whereby a hazardous material cannot be shipped under the Limited Quantity provisions, (e.g., where there is no Packing Instruction in Column G, List of Dangerous Goods, IATA Dangerous Goods Regulations, that is preceded by the letter "Y").

In such cases, the general instructions noted above but for non-Limited Quantity materials will apply, with one important difference: standard hazardous materials shipment requires the use of certified outer shipping containers. These containers have undergone rigid testing and are, therefore, designated by a "UN" stamp on the outside, usually along the bottom of a container's side. The UN stamp is also accompanied by codes specifying container type, packing group rating, gross mass, density, test pressure, year of manufacturer, state of manufacturer, and manufacturer code name. The transport of lithium batteries in Hermit Data Loggers is an example of a standard hazardous material where only a designated outer shipping container may be used.

5.4 Holding Times

The holding times for samples will depend on the analysis and the sample matrix. Refer to the FSP for holding times requirements.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

All sample shipments must be documented in the field logbooks and/or field forms, including rationales deviations from this SOP. The Field Team Leader or designated QA reviewer will check and verify that handling and shipment documentation has been completed per this procedure and other procedures referenced herein.

7.0 DECONTAMINATION

All shipment coolers shall be maintained clean of sampled material to avoid exposure during shipment. Any investigation-derived waste generated in the sampling process shall be managed in accordance with the procedures outlined in SOP-12.

8.0 REFERENCES

Agency for Toxic Substances and Disease Registry. 2006. Asbestos Exposure and Your Health.

Enforcement Considerations for Evaluations of Uncontrolled Hazardous Waste Disposal Sites by Contractors, Draft, Appendix D, April 1980.

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Date: May 20, 2009 OU3 SOP 9 (Rev. 5)

Title: FIELD DOCUMENTATION

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Remedial Project Manager	/RPM	5/21/09
SOP Author	W S Brattin	5/22/09

Revision Number	Date	Reason for Revision
0	09/26/2007	--
1	10/5/2007	• Add section for "Corrections and Modifications" and Field Modification Approval form (Attachment 3) • Update Labeling section and COC (Attachment 2) to reflect non-asbestos analysis and container details • Update FSDS forms (Attachment 1) based on field team input
2	02/22/2008	• Incorporate changes to FSDS forms (Attachment 1) based on field input • Remove OU3 phase specificity in SOP text
3	05/29/2008	• Incorporate changes to FSDS forms (Attachment 1) based on field input
4	06/30/2008	• Update Attachment 1 with all OU3 FSDS forms (including those used in Phase I and Phase II) • Remove OU3 phase specificity in Attachments
5	05/20/2009	• Add FSDS form for ABS Personal Air • Add FSDS form for Small Mammal Tissue • Modified COC to change medium code to "A-Air" to accommodate both ambient and activity-based sampling (ABS) air samples • Added new media code for small mammal tissue "MT"

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) is a general guidance document for the required documentation to be completed by field personnel during field investigations. This SOP is based on MWH SOP-04, Field Documentation, Revision 1.0, March 2006, modified for use at the Libby Mine Site. Documentation in the form of field logbooks, reports, and forms shall be completed for every activity in the field. Records shall be maintained on a daily basis as the work progresses. All field documentation shall be accurate and legible because it is deliverable to the client as potentially a legal document.

2.0 HEALTH AND SAFETY WARNING

All personnel engaged in soil sampling must follow health and safety protocols described in the site health and safety plan. Asbestos fibers are thin and long fibers so small that they cannot be seen by the naked eye. Asbestos fibers are easily inhaled when disturbed and when embedded in the lung tissue can cause health problems. Significant exposure to asbestos increases the risk of lung cancer, mesothelioma, asbestosis (non-cancerous lung disease), and other respiratory diseases (ATSDR 2006). All personnel engaged in soil sampling must follow health and safety protocols described in the health and safety plan.

3.0 RESPONSIBILITIES

This section presents a brief definition of field roles, and the responsibilities generally associated with them. This list is not intended to be comprehensive and often, additional personnel may be involved. Project team member information shall be included in project-specific plans (e.g., work plan, field sampling plan, quality assurance plan, etc.), and field personnel shall always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

Project Manager: Selects project-specific field documentation with input from other key project staff.

Quality Control Manager: Overall management and responsibility for quality assurance and quality control (QA/QC). Selects QA/QC procedures for the sampling and analytical methods, performs project audits, and ensures that data quality objectives are fulfilled.

Field Team Leader (FTL) and/or Field Geologist, Hydrogeologist, or Engineer: Implements the sampling program, supervises other sampling personnel, and ensures compliance with SOPs and QA/QC requirements. Prepares daily logs of field activities.

Field Technician (or other designated personnel): Assists the FTL and/or field geologist, hydrogeologist, or engineer in the implementation of field tasks and field documentation.

Field Sample/Data Manager: Responsible for proper handling and shipping of all samples collected by the field crew, electronic data entry of field sample data sheet (FSDS) and chain-of-custody (COC) forms, and scanning/posting of field documentation PDFs (FSDS, COC, field logbooks, digital photographs) to a dedicated FTP site.

4.0 FIELD DOCUMENTATION PROCEDURES

Field documentation serves as the primary foundation for all field data collected that will be used to evaluate the project site. There are two main forms of field documentation – field logbooks and FSDS forms. All field documentation shall be accurate, legible and written in indelible black or blue ink. Absolutely no pencils or erasures shall be used. Incorrect entries in the FSDS forms or field logbooks will be corrected by crossing out the incorrect entry with one line, the individual making the correction will initial and date next to the correction.

4.1 Field Logbooks

The field logbook shall be a bound, weatherproof book with numbered pages, and shall serve primarily as a daily log of the activities carried out during the fieldwork. All entries shall be made in indelible black or blue ink. A field logbook shall be completed for each operation undertaken during the field tasks. To further assist in the organization of the field log books, the project name and the date shall be recorded on top of each page along with the significant

activity description (e.g., surface sample or soil boring number). All original field documentation shall be retained in the project files.

Skipped pages or blank sections at the end of a field log book page shall be crossed out with an "X" covering the entire page or blank section; "No Further Entries," initials, and date shall be written by the person crossing out the blank section or page. The responsible field team member shall write his/her signature, date, and time after the day's last entry.

Field activities vary from project to project; however, the concept and general information that shall be recorded are similar. The descriptions of field data documentation given below serve as an outline; individual activities may vary in documentation requirements. A detailed description of two basic example logbooks, suitable for documentation of field activities, is given below. These field logbooks include the FTL logbook and the field geologist/sampling team logbook.

FTL Logbook: The FTL's responsibilities include the general supervision, support, assistance, and coordination of the various field activities. As a result, a large portion of the FTL's day is spent rotating between operations in a supervisory mode. Records of the FTL's activities, as well as a summary of the field team(s) activities, shall be maintained in a logbook. The FTL's logbook shall be used to fill out daily/weekly reports and daily quality control reports (DQCRs), and therefore, shall contain all required information. Entries shall be preceded with time in military units for each observation. Items to be documented include:

- Record of tailgate meetings
- Personnel and subcontractors on job site and time spent on the site
- Field operations and personnel assigned to these activities
- Site visitors
- Log of FTL's activities: time spent supervising each operation and summary of daily operations as provided by field team members
- Problems encountered and related corrective actions
- Deviations from the sampling plan and reasons for the deviations
- Records of communications; discussions of job-related activities with the client, subcontractor, field team members, and project manager

- Information on addresses and contacts
- Record of invoices signed and other billing information
- Field observations

Field Geologist/Sampling Team Logbook: The field geologist or sampling team leader shall be responsible for recording the following information in a logbook:

- Health and Safety Activities
  - Calibration records for health and safety equipment (e.g., type of PID, calibration gas used, associated readings, noise dosimeters, etc.)
  - Personnel contamination prevention and decontamination procedures
  - Record of daily tailgate safety meetings
- Weather
- Calibration of field equipment
- Equipment decontamination procedures
- Personnel and subcontractors on job site and time spent on the site
- Station identifier
- Sampling activities
  - Sample location (sketch)
  - Equipment used
  - Names of samplers
  - Date and time of sample collection
  - Sample interval
  - Number of samples collected
  - Analyses to be performed on collected samples
- Disposal of contaminated wastes (e.g., PPE, paper towels, Visqueen, etc.)
- Field observations
- Problems encountered and corrective action taken
- Deviations from the sampling plan and reason for the deviations
- Site visitors

4.2 Field Sample Documentation

Sample Labels: A unique sample identification label shall be affixed to all sample containers. All samples will be labeled in a clear, precise way for proper identification in the field and for tracking in the laboratory. At the time of collection, each sample will be labeled with a unique 5-digit sequential identification (ID) number, referred to as the Index ID. The Index ID for all samples collected as part of OU3 sampling activities will have a two-character prefix specific to the sampling Phase (e.g., Phase 1 samples will have a "P1" prefix, P1-12345) as specified in the applicable SAP. Index ID labels will be ½ inch x 1 ¾ inch in size and pre-printed for use in the field. For each Index ID, multiple labels will be printed to allow for multiple containers of the same sample (i.e., for different analyses).

Index ID Label Example:

P1-12345

Each collection container will be labeled with a container label that enables the field team member to record the container-specific details, such as the method of sample preparation (e.g., filtered/unfiltered), method of preservation, and the analytical methods that will be requested. Container labels will be 2 inch x 4 inch in size and pre-printed for use in the field. Any container-specific information shall be written in indelible ink.

Container Label Example:

Date/Time:_____

Index ID:

Media (circle one): AQ SO A BK DB TC MT
For AQ, Filtered? (circle one): Yes No
Container: _____
Preservation: _____
Analyses: _____
_____

Media acronyms: AQ – aqueous media, SO – solid media, A – air,
BK – tree bark, DB – organic debris, TC – tree age core, MT – mammal tissue

After labels have been affixed to the sample container, the labels will be covered with clear packaging tape to ensure permanence during shipping.

Any unused Index ID labels should be crossed out to avoid the possibility of using unused labels for a different sample.

Field Sample Data Sheet (FSDS) Forms: Data regarding each sample collected as part of the OU3 sampling will be documented using Libby-specific FSDS forms (provided as Attachment 1). These FSDS forms are medium-specific and designed to facilitate data entry of station location, sample details, and field measurements needed for the OU3 investigation.

In the field, one field team member will be responsible for recording all sample details onto the appropriate FSDS form. At the time of sample labeling, one Index ID label will be affixed to the FSDS form in the appropriate field. All written entries on the FSDS form shall be accurate, legible and written in indelible black or blue ink.

Once the FSDS form is complete, written entries will be checked by a second field team member. These two field team members will initial the bottom of the FSDS form in the appropriate field to document who performed the written data entry and who performed the QC check of the FSDS form.

On a weekly basis (or more frequently as conditions permit), information from the hard copy FSDS form will be manually entered into a field-specific OU3 database using electronic data entry screens by the Field Sample/Data Manager. Once electronic data entry is complete, QC of all data entry will be completed by the FTL or their designate. The Field Sample/Data Manager and the FTL will initial in the appropriate field on the paper FSDS form to document who performed the data entry into the database and who performed the QC check.

4.3 Photologs

Photologs are often used in the field to document site conditions and sample location characteristics. While photographs may not always be required, they shall be used wherever

applicable to show existing site conditions at a particular time and stage of the investigation or related site activity. Photolog information shall include:

- station location identifier
- Index ID (if applicable)
- date and time of photo
- direction/orientation of the photo
- description of what the photo is intended to show

An engineer's scale or tape shall be included in any photographs where scale is necessary. Any wasted frames or images in a roll of film or sequence of digital images shall be so noted in the field logbook.

4.4 Chain-of-Custody Records

Custody Seals: Custody seals with the date and initials of the sampler will be used on each shipping container to ensure custody. The custody seal will be placed on opposites sides of the cooler across the seam of the lid and the cooler body. Alternatively, if the sample containers are all placed inside a liner bag within the cooler, the custody seal may be placed across the seal of the liner bag inside of the cooler.

Chain-of-Custody Forms: COC procedures allow for the tracking of possession and handling of individual samples from the time of field collection through to laboratory analysis. Documentation of custody is accomplished through a COC form that lists each sample and the individuals responsible for sample collection and shipment, sample preparation, and receipt by the analytical laboratory. The COC form also documents the analyses requested for each sample. Whenever a change of custody takes place, both parties will sign and date the COC form, with the relinquishing party retaining a copy of the form. The party that accepts custody will inspect the COC form and all accompanying documentation to ensure that the information is complete and accurate. Any discrepancies will be noted on the COC form. Shipping receipts shall be signed and filed as evidence of custody transfer between field sampler(s), courier, and laboratory.

Attachment 2 provides an example of the COC form that will be used for all samples collected as part of OU3 sampling. This form will be printed as a carbonless triplicate form to facilitate retention of COC copies by relinquishing parties. As seen, the COC form includes the following information:

- sample identifier (Index ID)
- date and time of collection
- method of sample preparation and preservation
- number of sample containers
- analyses requested
- shipping arrangements and airbill number, as applicable
- recipient laboratories
- signatures of parties relinquishing and receiving the sample

On a daily basis, the Field Sample/Data Manager will package samples for shipping, complete hard copy COC forms, and ship all samples as outlined in SOP No. 8. On a daily basis, information from the hard copy COC form necessary for sample tracking will be manually entered into a field-specific OU3 database using electronic data entry screens by the Field Sample/Data Manager. Once electronic data entry is complete, QC of all data entry will be completed by the FTL or their designate.

5.0 FIELD DATA TRANSMITTAL

Copies of all FSDS forms, COC forms, and field log books will be scanned and posted in portable document format (PDF) to a project-specific file transfer protocol (FTP) site daily. This FTP site will have controlled access (i.e., user name and password are required) to ensure data access is limited to appropriate project-related personnel. File names for scanned FSDS forms, COC forms, and field log books will include the sample date in the format YYYYMMDD to facilitate document organization (e.g., FSDS_20090831.pdf).

Electronic copies of all digital photographs will also be posted weekly (or more frequently as conditions permit) to the project-specific FTP site. File names for digital photographs will include the station identifier, the sample date, and photograph identifier (e.g., ST-1_20090831_12459.tif).

A copy of the field-specific OU3 database will be posted to the project-specific FTP site on a weekly basis (or more frequently as conditions permit). The field-specific OU3 database posted to the FTP site will include the post date in the file name (e.g., FieldOU3DB_20090831.mdb).

6.0 CORRECTIONS AND MODIFICATIONS

6.1 Field Deviations and Modifications

It is recognized that deviations and modifications from the standard operating procedures may be necessary based on site conditions. Any requested field modifications will be submitted by Robert Marriam (Remedium Group, Inc. - W.R. Grace contractor) to Bonita Lavelle (EPA Region 8 - Remedial Project Manager) for review and approval. All modification requests will be recorded in a Field Modification Approval Form (see Attachment 3).

6.2 Corrections to Hard Copy Forms

If an error is identified on an FSDS or COC form prior to entry into the field-specific OU3 database, the information should be corrected on the hard copy form by crossing out the incorrect entry with one line, the individual making the correction will initial and date next to the correction. Data entry into the field-specific OU3 database and scanning/posting of the hard copy forms should proceed following the data entry procedures described above.

If an error is identified on an FSDS or COC form after entry into the field-specific OU3 database, the information should be corrected on the hard copy form by crossing out the incorrect entry with one line, the individual making the correction will initial and date next to the correction. The corrected form should be scanned and posted to the project-specific FTP site. File names for corrected FSDS forms will include the Index ID of the corrected sample to facilitate document organization (e.g., FSDS_C_P1-12345.pdf). File names for corrected COC

forms will include the COC ID of the corrected COC form to facilitate document organization (e.g., COC_C_OU3-36512.pdf). Necessary data corrections will be made to the master OU3 database by the database manager.

If changes are made to a COC form, the analytical laboratory should be provided with a corrected COC form.

7.0 REFERENCES

Agency for Toxic Substances and Disease Registry. 2006. Asbestos Exposure and Your Health.

RCRA Ground-Water Monitoring: Draft Technical Guidance, November 1992.

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ATTACHMENT 1

OU3 FIELD SAMPLE DATA SHEET (FSDS) FORMS

This page intentionally left blank to facilitate double-sided printing.

Sheet No.: AA2-_____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS) rev2
STATIONARY AMBIENT AIR MONITOR

☐ Check box if GPS information has been recorded previously

Field Logbook No: _____ Page No: _____

Station ID: _____ Station Comments: _____

GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters

X coord: _____ Y coord: _____ Elevation: _____m

Sampling Team: _____ Sampler Initials: _____

Data Item	Cassette 1			Cassette 2			Cassette 3		
Index ID	*AFFIX LABEL HERE*			*AFFIX LABEL HERE*			*AFFIX LABEL HERE*		
Sample Height (ft)									
Location Description									
Field QC Type (circle)	FS-(field sample) FB-(field blank) FD-(field dup) For FD, Parent ID: _____			FS-(field sample) FB-(field blank) FD-(field dup) For FD, Parent ID: _____			FS-(field sample) FB-(field blank) FD-(field dup) For FD, Parent ID: _____		
Matrix Type	Outdoor			Outdoor			Outdoor		
Flow Meter Type	Rotameter			Rotameter			Rotameter		
Archive blank (circle)	Yes No			Yes No			Yes No		
Pump ID Number									
Flow Meter ID Number									
Start Date (mm/dd/yy)									
Start Time (hh:mm)									
Start Counter									
Daily Flow Check: Record time (hh:mm) and flow rate (L/min) in fields provided	Check1	Time	Flow	Check1	Time	Flow	Check1	Time	Flow
	Check2			Check2			Check2		
	Check3			Check3			Check3		
	Check4			Check4			Check4		
Stop Date (mm/dd/yy)									
Stop Time (hh:mm)									
Stop Counter									
Pump fault? (circle)	Yes No			Yes No			Yes No		
Stop Flow (L/min)									
Field Comments Cassette Lot Number: _____									
Entered By (Provide initials):				**Validated By (Provide initials):**					

For Data Entry Completion (Provide Initials)	Completed by:	QC by:

Sheet No.: FSB1- _____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS) rev2
FOREST SOIL AND TREE BARK

Field Logbook No: _____ Page No: _____

Station ID: _____ Sampling Date: _____

GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters

X coord: _____ Y coord: _____ Elevation: _____m

Sampling Team: _____ Sampler Initials: _____

Station Comments: _____

TREE BARK SAMPLES

Index ID:	**Field QC Type (circle one):** FS (field sample) FD (field duplicate) For FD, Parent ID: _____	**Sample Area (cm^2):** _____	**Tree Species:** _____ **Collection Height (ft):** _____ **Diameter* (in):** _____	**Age Core Collected? (circle one):** Y N
Index ID:	**Field QC Type (circle one):** FS (field sample) FD (field duplicate) For FD, Parent ID: _____	**Sample Area (cm^2):** _____		
Field Comments:				
Entered by (Provide initials):		**Validated by (Provide initials):**		

*Measured with "D-tape"

FOREST SOIL SAMPLES

Index ID:	**Field QC Type (circle one):** FS (field sample) FD (field duplicate) For FD, Parent ID: _____	**Bulk Soil Description** **Depth (in)** **Start:** _____ **End:** _____	**Sample Type:** Grab Composite **# of Comp.:** ___	**Organic Debris Collected? (circle one):** Y N
Index ID:	**Field QC Type (circle one):** FS (field sample) FD (field duplicate) For FD, Parent ID: _____	**Bulk Soil Description** **Depth (in)** **Start:** _____ **End:** _____	**Sample Type:** Grab Composite **# of Comp.:** ___	**Organic Debris Collected? (circle one):** Y N
Index ID:	**Field QC Type (circle one):** FS (field sample) FD (field duplicate) For FD, Parent ID: _____	**Bulk Soil Description** **Depth (in)** **Start:** _____ **End:** _____	**Sample Type:** Grab Composite **# of Comp.:** ___	**Organic Debris Collected? (circle one):** Y N
Field Comments:				
Entered by (Provide initials):		**Validated by (Provide initials):**		

For Data Entry Completion (Provide Initials)	Completed by	QC by

Sheet No.: GW2- _____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS) rev3
GROUNDWATER

☐ Check box if GPS information has been recorded previously

Field Logbook No: _____ Page No: _____

Station ID: _____ Station Alias:_____ Sampling Date: _____

GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters

X coord: _____ Y coord: _____ Elevation (meters): _____

Sampling Team: _____ Sampler Initials: _____

Station Comments: _____

Well: Measuring Point (MP) of Well: _____ MP Units: _____

Screened Interval (ft BGL): _____ Filter Pack Interval (ft BGL):_____

Casing Stickup (ft) _____ Sample Intake Depth (ft BMP): _____

Calibration:

☐ Daily Verification Weekly Date: _____

VOA Vial pH: _____ Other pH:_____

Purge Method:

☐ Dedicated Submersible (SP) ☐ Portable Bladder (BP) ☐ Peristalic (PP)

☐ Portable Submersible (SP) ☐ Dedicated Bailer (B) ☐ Grab (G)

☐ Dedicated Bladder (SP) ☐ Disposable Bailer (B) ☐ Other: _____

Multiplication Factors:

1" = 0.04 2" = 0.16

3" = 0.37 4" = 0.65

6" = 1.47

Purge:

Starting Water Level (ft BMP):_____ Total Depth (ft BGL): _____ Water Column Height (ft): _____

Casing Diameter (in ID): _____ Multiplication Factor: _____ Casing Volume (gal): _____ 2X: _____ 3X: _____ 4X: _____

Water Level (ft BMP) at End of Purge: _____ Total Depth (ft BMP) at End of Purge: _____

Time (hh:mm)	Temp. (°C)	pH	Spec. Cond. (mS/cm@25°C)	ORP (mV)	Diss. O_2 (mg/L)	Turbidity (NTU)	Vol. Evac. (gal)	Flow Rate (gal/min)	Comments
Final Parameters									

Data Item	**Sample 1**	**Sample 2**	**Sample 3**
Index ID	*AFFIX LABEL HERE*	*AFFIX LABEL HERE*	*AFFIX LABEL HERE*
Field QC Type (circle one):	FS SP FD MS MSD PE EB FB TB Parent ID: _____	FS SP FD MS MSD PE EB FB TB Parent ID: _____	FS SP FD MS MSD PE EB FB TB Parent ID: _____
Field Comments:			
Cooler:			
Entered by (Provide initials):		**Validated by (Provide initials):**	

Note:

FS	Field Sample	**SP**	Field Split Sample	**FD**	Field Duplicate Sample
TB	Trip Blank Sample	**MS**	Matrix Spike Sample	**MSD**	Matrix Spike Duplicate Sample
FB	Field Blank Sample	**EB**	Equipment Decon Blank Sample	**PE**	Performance Evaluation Sample

For Data Entry Completion (Provide Initials)	Completed by	QC by

Sheet No.: SM- _____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS) rev2
SOIL-LIKE MATERIALS

Field Logbook No: _____ Page No: _____

Station ID: _____ Sampling Date: _____

GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters

Sampling Team: _____ Sampler Initials: _____

Station Comments: _____

Data Item	**Sample 1**	**Sample 2**	**Sample 3**
Index ID	*AFFIX LABEL HERE*	*AFFIX LABEL HERE*	*AFFIX LABEL HERE*
Matrix (circle one):	Surface Soil Tailings Waste Rock Roadway Other _____	Surface Soil Tailings Waste Rock Roadway Other _____	Surface Soil Tailings Waste Rock Roadway Other _____
Sample Time (hh:mm)			
Sample Type (circle one):	Grab Composite # of Comp: _____	Grab Composite # of Comp: _____	Grab Composite # of Comp: _____
Sample Depth	Start Depth (in): _____ End Depth (in): _____	Start Depth (in): _____ End Depth (in): _____	Start Depth (in): _____ End Depth (in): _____
Field QC Type (circle one):	FS (field sample) FD (field duplicate) For FD, Parent ID: _____ TB (trip blank) Cooler:_____ PE (perf. eval.) ID:_____	FS (field sample) FD (field duplicate) For FD, Parent ID: _____ TB (trip blank) Cooler:_____ PE (perf. eval.) ID:_____	FS (field sample) FD (field duplicate) For FD, Parent ID: _____ TB (trip blank) Cooler:_____ PE (perf. eval.) ID:_____
Transect Start Location or Grab Sample Location	X coord:_____m Y coord:_____m Elevation:_____m	X coord:_____m Y coord:_____m Elevation:_____m	X coord:_____m Y coord:_____m Elevation:_____m
Transect End Location	X coord:_____m Y coord:_____m Elevation:_____m	X coord:_____m Y coord:_____m Elevation:_____m	X coord:_____m Y coord:_____m Elevation:_____m
Field Comments:			
Cooler:			
Entered by (Provide initials):		**Validated by (Provide initials):**	

For Data Entry Completion (Provide Initials)	Completed by	QC by

Sheet No.: *SWS-* _____
SED- _____

LIBBY OU3 FIELD SAMPLE DATA SHEET
SURFACE WATER AND SEDIMENT

Station ID: _____ **Sampling Date**: _____
Field Logbook ID: _____ **Logbook Page No**: _____
GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters
***For New Stations Only*:** **X coord:** _____ **Y coord:** _____ **Elev:** _____
Sampling Team: **MWH** **Samplers Initials:** _____

WATER QUALITY PARAMETERS (if applicable)

Time Measured (hh:mm)	Temp. (°C)	pH	Specific Conductance (mS/cm Auto-comp @ 25°C)	Diss. O_2 (mg/L)	ORP (mV)	Turbidity (NTU)

SAMPLE COLLECTION

Index ID	*AFFIX LABEL HERE*	**Sampling Time:**_____ **Sample Type: Field Sample** **Media : Surface Water Sediment**	**Sampling Method** (if applicable)**:** **Grab or Composite** **# of Composites:**_____ **Sampling Depth: Top (in)**_____ **Bot (in)**_____
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**_____ **Sample Type: SP FD** **MS MSD PE** **FB TB EB** **Media : Surface Water Sediment**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**_____ **Sampling Depth: Top (in)**_____ **Bot (in)**_____
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**_____ **Sample Type: SP FD** **MS MSD PE** **FB TB EB** **Media : Surface Water Sediment**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**_____ **Sampling Depth: Top (in)**_____ **Bot (in)**_____
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**_____ **Sample Type: SP FD** **MS MSD PE** **FB TB EB** **Media : Surface Water Sediment**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**_____ **Sampling Depth: Top (in)**_____ **Bot (in)**_____

COMMENTS

Note:						
	FS	Field Sample	**SP**	Field Split Sample	**FD**	Field Duplicate Sample
	TB	Trip Blank Sample	**MS**	Matrix Spike Sample	**MSD**	Matrix Spike Duplicate Sample
	FB	Field Blank Sample	**EB**	Equipment Decon Blank Sample	**PE**	Performance Evaluation Sample

Field Data Entered by:		**Field Entries Checked by:**	

Database Entry:		*Database QC:*

Sheet No.: SM- _____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS)
SMALL MAMMAL TISSUE COLLECTION

Field Logbook ID: _____ **Logbook Page No**: _____

Necropsy Date: _____ **Personnel Initials**: _____

Small Mammal Field ID: **SM-**_____-_____-_____-_____ **Animal Weight (grams):** _____(w/o fetuses if pregnant)

*[**SM** - station ID - transect ID - trap# - animal#]*

General Necropsy Comments: _____

_____

_____

	TISSUE #1	TISSUE #2	TISSUE #3	TISSUE #4
Tissue Type (circle one):	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____
Weight (mg):				
Index ID:	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*
Field QC Type (circle one):	FS FD TB	FS FD TB	FS FD TB	FS FD TB
Tissue Comments:				

	TISSUE #5	TISSUE #6	TISSUE #7	TISSUE #8
Tissue Type (circle one):	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____
Weight (mg):				
Index ID:	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*
Field QC Type (circle one):	FS FD TB	FS FD TB	FS FD TB	FS FD TB
Tissue Comments:				

	TISSUE #9	TISSUE #10	TISSUE #11	TISSUE #12
Tissue Type (circle one):	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____	TY AR ES ST SIN LIN LU EY CAR Other:_____
Weight (mg):				
Index ID:	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*	*Affix Label Here*
Field QC Type (circle one):	FS FD TB	FS FD TB	FS FD TB	FS FD TB
Tissue Comments:				

Tissue Type Descriptors: TY = thyroid; ARD = adrenal gland; ES = esophagus; SIN = small intestine; LIN = large intestine; LU = lung; EY = eyeball; CAR = carcass
Field QC Type Descriptors: FS = Field Sample; FD = Field Duplicate; TB = Tissue Blank

For Data Entry Completion (Provide Initials)	Completed by	QC by

ATTACHMENT 2

OU3 CHAIN OF CUSTODY FORM

LIBBY OU3 – CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

COC No. _____

PAGE: _____ OF: _____

ENTERED BY (Signature): _____ PROJECT MANAGER: _____ DATE: _____

METHOD OF SHIPMENT: _____ CARRIER/WAYBILL NO.: _____ DESTINATION: _____

SAMPLES							ANALYSIS REQUEST																													
							Asbestos			Non-Asbestos (a)																										
Index ID	Date	Time	Media*	Air Volume (L) or Tree Bark Sample Area (cm^2)	Filtered	Archive	TEM-ISO 10312 (b,c)	PLM (d)		TAL Metals+Boron	Mercury	TOC	DOC	Paste pH	Fluoride	Chloride, Sulfate	Total Phosphorus	Cyanide	VPH	EPH	OPP Pesticides	Chlorinated Pesticides	Herbicides	PCBs	SVOCs	VOCs	TDS, TSS, Nitrite, Alkalinity	Ammonia, Nitrate, TKN	Orthophosphate	Radiochemistry	Radium, Uranium	Hardness			Age core (e)	Remarks

	TOTAL NUMBER OF CONTAINERS	LABORATORY COMMENTS/CONDITION OF SAMPLES	Cooler Temp:

RELINQUISHED BY:			DATE	TIME	RECEIVED BY:		
SIGNATURE	PRINTED NAME	COMPANY			SIGNATURE	PRINTED NAME	COMPANY

** Media: AQ - Aqueous SO – Solid A –Air BK – Tree Bark DB – Organic Debris (Duff) TC – Tree Age Core MT – Mammal Tissue*

Notes --

(a) Method, container, and preservation details are provided in the attached tables

(b) With Libby-specific modifications. See applicable O3 SAP for counting and stopping rules

(c) See applicable SAP for details on preparation methods.

(d) Preparation by ISSI-LIBBY-01 and analysis by SRC-LIBBY-01 (PLM-Grav) and SRC-LIBBY-03 (PLM-VE)

(e) In accordance with procedures in Phipps (1985).

DISTRIBUTION: PINK: Field Copy YELLOW: Laboratory Copy WHITE: Return to Originator

ATTACHMENT 3

OU3 FIELD MODIFICATION APPROVAL FORM

FIELD MODIFICATION APPROVAL FORM
LFM-OU3-_____
Libby OU3 Phase ___ Sampling & Analysis Plan

Requested by:_____ Date:_____

Description of Deviation:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

☐ EPA Region 8 has reviewed this field modification approves as proposed.

☐ EPA Region 8 has reviewed this field modification and approves with the following exceptions:

_____
_____
_____
_____
_____
_____
_____

☐ EPA Region 8 has reviewed this field modification and does not agree with the proposed approach for the following reasons:

_____
_____
_____
_____
_____
_____

_____ _____
Bonita Lavelle, EPA RPM Date

Libby Superfund Site Operable Unit 3 Standard Operating Procedure

Date: September 26, 2007 OU3 SOP 12 (Rev. 0)

Title: INVESTIGATION DERIVED WASTE (IDW) MANAGEMENT

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Remedial Project Manager		9/26/07
SOP Author		9/26/07

Revision Number	Date	Reason for Revision
0	09/26/2007	--

1.0 INTRODUCTION

This SOP is based on MWH SOP-07, Investigation-Derived Waste (IDW) Management, Revision 1.0, April 2007, modified for use at the Libby Asbestos Superfund Site OU3. IDW may be generated during field investigations at the Libby Asbestos Superfund Site OU3. The National Contingency Plan (NCP), codified in 40 Code of Federal Regulations (CFR) 300, requires that IDW be handled to attain all the applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the urgency of the situation. The purpose of this SOP is to present procedures to be followed in the management of IDW generated during the field investigations.

Typical IDW generated during field activities are solid wastes and may include (but are not limited to) the following media and waste types:

Fluids	Solids
Purge water and groundwater	Soils and soil cuttings
Drilling mud	Plastic tarps or sheeting
Grout	Drill pipe and well casing/screen
Decontamination fluids and wastewater	Decontamination solids
	Disposable equipment (i.e., rope, bailers, sampling equipment, & other consumables)
	Spent personal protective equipment (PPE)
	Used containers, sample bottles
	Packaging materials

The above wastes may or may not be encountered, generated or managed while performing field investigations. However, all solid waste streams will be characterized to determine if they are hazardous wastes per 40 CFR § 262.11 for the purposes of handling and disposal. Guidance from this document shall be used as part of project planning to estimate total volumes of IDW likely to be generated as well as how the IDW will be managed and disposed.

2.0 HEALTH AND SAFETY WARNING

All personnel engaged in IDW handling must follow health and safety protocols described in the health and safety plan. Asbestos fibers are thin and long fibers so small that they cannot be seen by the naked eye. Asbestos fibers are easily inhaled when disturbed and when embedded in the lung tissue can cause health problems. Significant exposure to asbestos increases the risk of lung cancer, mesothelioma, asbestosis (non-cancerous lung disease), and other respiratory diseases (ATSDR 2006).

3.0 DEFINITIONS

Area of Contamination (AOC) unit: The AOC unit concept is critical to the IDW management at a CERCLA investigation site. Although EPA has not promulgated a definition of an AOC unit, an AOC unit is generally an area within a CERCLA investigation site with similar characteristics with respect to contamination and the associated risks to human health and the environment. A CERCLA investigation site may contain one or more AOC units.

Decontamination fluids: Any fluids, including aqueous wash water, solvents, and contaminants that are used or generated during decontamination procedures.

Decontamination solids: Any solids, including soils and soil cuttings, fill materials, and contaminants that are generated during decontamination procedures.

Grout: A fluid mixture of cement and water (neat cement) of a consistency that can be forced through a pipe and placed as required.

Hazardous waste: A solid waste that meets the definition of a hazardous waste under RCRA as defined in 40 CFR § 261.3.

Investigation-derived waste (IDW): Solid wastes, as defined in 40 CFR § 261.2, directly generated as result of performing the field activities.

Nonhazardous waste: A solid waste that does not meet the definition of a hazardous waste as defined in 40 CFR § 261.3 or is excluded from hazardous waste regulation per 40 CFR § 261.4(b).

Soils and soil cuttings: Solid material generated from excavation or drilling processes. Soils may include native soils, fill materials, and/or other historical plant waste streams used as fill materials on the site.

Solid waste: Any waste stream (solid, liquid or containerized gas) that meets the definition of solid waste under RCRA as defined in 40 CFR § 261.2**.**

4.0 RESPONSIBILITIES

This section presents a brief definition of the field team roles and responsibilities for management of IDW generated while conducting field investigations. This list is not intended to be a comprehensive list as additional personnel may be involved. Project team member information shall be included in project-specific plans (e.g., work plan, field sampling plan (FSP), quality assurance plan, etc.), and field personnel shall always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

Project Manager: Responsible to ensure that all field team members are properly trained per their responsibilities associated with IDW and that appropriate equipment and facilities are available for appropriate IDW management.

Field Team Leader (FTL): Implements the field program and supervises all field team members in the appropriate management of IDW. Ensures that only properly trained personnel are managing IDW on the site.

Environmental, Health and Safety (EHS) Officer: Assists the Team Leader in the supervision of all IDW management on site. The EHS officer shall be responsible for all IDW identification

and characterization, on site disposal, off site shipment and disposal, waste accumulation, emergency response and contingency planning, IDW training, and IDW reporting and recordkeeping.

Project Team Members: Ensure that they are properly trained prior to any IDW management as well as follow the appropriate IDW procedures and training.

5.0 REGULATORY BASIS AND GUIDANCE

IDW encountered, generated, or managed during the field investigations may contain hazardous substances as defined by CERCLA. Some IDW may be hazardous wastes under RCRA while others may be regulated under other federal laws such as TSCA. These regulatory requirements may be applicable or relevant and appropriate requirements (ARARs) which impact how the IDW is managed.

5.1 EPA Guidance on IDW Management

The management of IDW shall be in accordance with EPA Guidance "Management of Investigation-Derived Wastes During Site Inspections", May 1991 (EPA, 1991). The specific elements of EPA's guidance for IDW management are as follows:

- Characterizing IDW through the use of existing information (manifests, MSDSs, previous test results, knowledge of the waste generation process, and other relevant records) and best professional judgement.

- Delineating an AOC unit for leaving RCRA hazardous soil cuttings within the unit.

- Containerizing and disposing of RCRA hazardous groundwater, decontamination fluids, PPE, and disposable equipment at RCRA Subtitle C facilities.

- Leaving on-site RCRA nonhazardous soil cuttings, groundwater, and decontamination fluids preferably without containerization and testing.

In general, EPA does not recommend removal of wastes from sites, in particular, from those sites where IDW do not pose any immediate threat to human health or the environment. Actions taken during field investigations with respect to IDW that leave conditions essentially unchanged should not require a detailed analysis of ARARs or assurance that conditions at the site after field investigations will comply with the ARARs. At the same time, field personnel ensure that their handling of IDW does not create additional hazards at the site.

In brief, compliance with the NCP can generally be assured by:

1) Identifying contaminants, if any, present in the IDW based upon existing information and best professional judgement; testing is not required in most circumstances.

2) Determining ARARs and the extent to which it is practicable to comply with them.

3) Delineating an AOC unit based upon existing information and visual observation if soil cuttings are RCRA hazardous.

4) Burying RCRA hazardous soil cuttings within the AOC unit, so long as no increased hazard to human health and the environment will be created. Containerization and testing are not required.

5) Containerizing RCRA hazardous groundwater and other RCRA hazardous IDW such as PPE, disposable sampling equipment, and decontamination fluids for off-site disposal.

5.2 Hazardous Waste Regulation

The RCRA hazardous waste regulations are clearly ARARs for hazardous IDW generated and managed during field investigations. However, with the application of EPA IDW guidance, RCRA requirements apply to management of IDW in the following manner:

- If RCRA hazardous IDW is stored or disposed off-site, then comply with all RCRA (and other ARAR) requirements.

- If RCRA hazardous IDW is stored on-site, then comply with RCRA (and other ARAR) requirements to the extent practicable.

For these field investigations, the following general guidance is expected to be practicable and therefore followed, recognizing that each situation will be evaluated against EPA IDW guidance (EPA, 1991) as well as RCRA hazardous waste requirements and other ARARs:

- IDW may be assumed not to be a "listed" hazardous waste under RCRA 40 CFR 261 Subpart D, unless available information about the site suggests otherwise.

- IDW characterization to determine if the IDW exhibits RCRA hazardous waste characteristics do not typically require testing if the characterization can be made by "applying knowledge of the hazardous characteristics in light of the materials or processes used" or by historical testing consistent with 40 CFR § 262.11(c).

- Compliance with the RCRA hazardous waste generator requirements of 40 CFR Part 262 for all RCRA hazardous IDW generated and/or managed (with exception of soil cuttings managed in accordance with the EPA IDW guidance). It is presumed that the RCRA hazardous IDW generated will fall within the large quantity generator (LQG) requirements.

- Land disposal does <u>not</u> occur (and thus the Land Disposal Restrictions [LDR] of 40 CFR Part 268 are <u>not</u> applicable) when IDW soil cutting wastes are:

  - Moved, stored or left in place within a single AOC unit;
  - Capped in place;
  - Treated in situ (without moving the IDW to another AOC unit for treatment); or
  - Processed within the AOC unit to improve structural stability (without placing the IDW into another AOC unit for processing).

- Conversely, land disposal does occur (and the LDR of 40 CFR Part 268 are applicable) when IDW soil cutting wastes are:

  - Moved from one AOC unit to another AOC unit for disposal;
  - Moved outside an AOC unit for treatment or storage and returned to the same AOC unit for disposal;
  - Excavated from an AOC unit and placed in a container, tank, surface impoundment, etc. and then re-deposited back into the same AOC.

5.3 TSCA PCB Regulation

IDW containing PCBs at detectable levels may be generated, although the concentration of PCBs in any IDW generated is expected to be far below 50 ppm. However, IDW generated will be evaluated for PCBs and managed according to the following per the requirements of 40 CFR Part 761 Subpart D:

- Liquid IDW at concentrations greater than or equal to 50 ppm PCBs will be incinerated off-site at a TSCA-approved incinerator site.

- Nonliquid IDW at concentration greater than or equal to 50 ppm PCBs may be incinerated, treated by an equivalent TSCA-approved method, or disposed in a TSCA chemical landfill off-site.

- IDW at concentrations less than 50 ppm are generally not regulated under TSCA, and may be disposed in an acceptable Subtitle D facility.

6.0 DESCRIPTION OF ANTICIPATED IDW MANAGEMENT

The following subsections provide a description of the anticipated IDW to be encountered, generated, and/or managed at the Libby Asbestos Superfund Site OU3 during field activities and the anticipated management of each. It should be noted that this information is provided for planning purposes, and will be evaluated and may need to be revised based upon actual experience while on site.

6.1 Soil and Soil Cuttings

During field investigations, surface soil samples, samples of mine waste rock, and samples of fine tailings will be collected. Only a small portion of material will be collected for analysis. While the soil and soil cuttings IDW generated will be evaluated on a case-by-case basis, the general approach will follow the EPA guidance for IDW (EPA, 1991) which includes:

- Characterizing the IDW through the use of existing information (previous test results, previous waste characterization, knowledge of the waste generation process, and other relevant records) and best professional judgement.

- Soil and soil cuttings which are not used directly for sample makeup will not be taken outside of the AOC unit in which they were generated.

- Soil and soil cuttings within the AOC where they are generated will be placed back into the same investigation pit, trench, or bore hole and in the same order from which the material was removed, to the extent practicable and unless noted otherwise in the FSP.

- Soil cuttings potentially requiring RCRA disposal will be handled per the procedures presented in Section 7.0 below and disposed in an off-site RCRA facility.

6.2 Spent Sampling-Related Equipment

During field investigations, spent sampling-related equipment will be generated. This may include (but not limited to) plastic sheeting/tarps, rope, bailers, sampling equipment, spent PPE, sample bottles, used containers, packaging materials, and other consumables. Although the vast majority of the spent sampling-related equipment is expected to be nonhazardous, these IDW may contain a listed hazardous waste (e.g., spent solvents) or may exhibit a hazardous waste characteristic (e.g., toxicity from metals).

While the spent sampling-related equipment will be evaluated on a case-by-case basis, the general approach to be followed for spent sampling-related equipment IDW will follow the EPA guidance for IDW (EPA, 1991) which includes:

- Containerizing the spent sampling-related equipment, typically in a satellite accumulation station.

- Characterizing the spent sampling-related equipment IDW through the use of existing information (previous test results, previous waste characterization, knowledge of the contaminants present, and other relevant records) and best professional judgement. This characterization will be documented and maintained as part of the solid/hazardous waste determination records.

- Those spent sampling-related equipment IDW that are determined to be nonhazardous will be disposed of onsite or as municipal waste.

- Those spent sampling-related equipment IDW that are determined to be hazardous will be managed per the procedures presented in Section 7.0 below and disposed in an off-site RCRA facility.

6.3 Decontamination Fluids and Solids

During field investigations, decontamination fluids and solids will be generated. Typically, these will be generated at a common decon area, although there may be more than one decon

area. Typically, the decontamination IDW will include (but not limited to) washwater from vehicles/equipment, and cleaning agents. Although the vast majority of decontamination IDW is expected to be nonhazardous, this IDW may contain a listed hazardous waste (e.g., spent solvents) or may exhibit a hazardous waste characteristic (e.g., toxicity from metals).

While the decontamination IDW will be evaluated on a case-by-case basis, the general approach to be followed for decontamination IDW will follow the EPA guidance for IDW (EPA, 1991) which includes:

- Containment of decontamination fluids (typically washwater) as generated. The washwater will be segregated from solids to the extent practicable (i.e., solids will be allowed to settle out of the washwater on the decontamination containment pad). Washwater will then be containerized to await waste determination. Solids will also be containerized in a separate container to await waste determination.

- Other decontamination solids such as cleaning utensils and PPE will also be containerized to await waste determination.

- Characterizing the decontamination IDW through the use of existing information (previous test results, previous waste characterization, knowledge of the contaminants present, and other relevant records) and best professional judgement. This characterization will be documented and maintained as part of the solid/hazardous waste determination records.

- The decontamination solids IDW that are determined to be nonhazardous will be disposed of onsite.

- The decontamination liquids IDW that are determined to be nonhazardous will be disposed as a nonhazardous solid waste, preferably on-site.

- The decontamination IDW (either liquid or solid) that are determined to be hazardous will be managed per the procedures presented in Section 7.0 below and disposed in an off-site RCRA facility.

6.4 Drilling, Well Purging, and Development Water

Generally, water at the Site that is extracted from boreholes, wells or piezometers for the purpose of drilling, development, sampling, or hydraulic testing is considered non-hazardous and will be discharged to designated shallow sumps away from the boreholes or wells at the site. If the water generated is determined to be hazardous will be managed per the procedures presented in Section 7.0 below and disposed in an off-site RCRA facility.

7.0 PROCEDURES FOR HAZARDOUS IDW MANAGEMENT

The following procedures apply to all IDW that have been determined to be hazardous except for soil cuttings IDW that remain with the AOC unit.

7.1 Introduction

Once an IDW has been determined to be hazardous, the federal RCRA Subtitle C waste management requirements apply to that waste. The scope of this procedure covers the requirements for large quantity generators (LQG) of hazardous IDW which manage the hazardous IDW on site such that RCRA permitting is not required.

7.2 Determine Land Disposal Restrictions

The 1984 amendments to the RCRA law included a prohibition of land disposal of certain hazardous wastes without first meeting some treatment standards. For the most part, all listed and characteristic hazardous wastes must be treated according to the treatment levels and technologies outlined in 40 CFR Part 268 to reduce the toxicity and/or mobility of hazardous constituents prior to being disposed of on the land, i.e., landfilled. Therefore, a generator must

determine if the waste is a "restricted waste" under the land ban rules, and if so, off site treatment and disposal is limited. Note that these rules apply only to wastes destined for land disposal which is defined as: placement in or on the land including a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or concrete vault or bunker. Wastes which are shipped off site for disposal other than land disposal are not regulated under the land disposal restriction regulations of 40 CFR Part 268.

Generators of hazardous wastes must determine if the waste is restricted from land disposal under 40 CFR Part 268. The following reporting and recordkeeping requirements apply.

- If a generator determines that he is managing a restricted waste and the waste does not meet the applicable treatment standards, with each shipment of waste, the generator must notify the treatment or storage facility in writing of the appropriate treatment standards;
- If the generator determines that he is managing a restricted waste and the waste can be disposed without further treatment, with each shipment of waste, the generator must submit to the treatment, storage or disposal facility a notice and certification stating that the waste meets the applicable treatment standards;
- If the generator determines that he is managing a waste subject to an exemption from a prohibition on the type of land disposal method utilized for the waste, with each shipment of waste, the generator must submit to the receiving facility a notice stating that the waste is not prohibited from land disposal;
- If the generator is managing prohibited waste in tanks, containers, or containment buildings regulated under 40 CFR 262.34, and is treating such waste in such tanks, containers, or containment buildings to meet applicable treatment standards, the generator must develop a waste analysis plan which describes the procedures the generator will carry out to comply with the treatment standards; and

- If the generator determines whether the waste is restricted based solely on his knowledge of the waste, all supporting data used to make this determination must be retained on-site in the generator's files.

The generator must retain on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced pursuant to these requirements for at least three years from the date the waste was last shipped from the site. It should also be noted that it is prohibited to dilute a hazardous waste in order to circumvent the land disposal prohibitions (40 CFR 268.3). Once a waste is determined to be a "restricted waste", an appropriate Treatment, Storage, and Disposal Facility (TSDF) can be selected to properly treat and dispose of the waste.

7.3 On-Site Accumulation

As discussed in Section 5.0 above for each IDW generated, a large quantity generator (LQG) must make the appropriate hazardous waste determination per 40 CFR Part 262.11. If the IDW is determined to be hazardous, then the IDW will typically be stored on-site prior to shipment off-site for disposal. The following requirements apply to all hazardous IDW being stored on-site prior to shipment.

7.3.1 EPA Identification Number (40 CFR Part 262.12)

Any facility which is a LQG of hazardous wastes must not treat, store, dispose, transport or offer for transportation any hazardous waste without first obtaining a EPA identification number from EPA (or the authorized state). Hazardous wastes cannot be offered to transporters or to treatment, storage or disposal facilities that have not received a EPA identification number.

7.3.2 On-Site Hazardous Waste Accumulation (Storage) (40 CFR 262.34(d))

Two types of accumulation areas for hazardous waste are permissible for a LQG without RCRA interim status or a Part B permit. These are the "90-day storage area" and the "satellite accumulation station" (SAS). The SAS requirements are discussed below. With regards to a

"90-day storage area", a LQG may store hazardous wastes on-site for up to 90 days or less in a storage area, provided that the following conditions are met:

- If the waste is placed in containers, the requirements of 40 CFR Part 265 Subpart I (container requirements) are met. See below for container requirements;
- If the waste is placed in tanks, the requirements of 40 CFR 265 Subpart J (tank requirements) are met. See below for the tank requirements.
- At closure, the generator closes the storage area per the requirements of 40 CFR 265.111 and 40 CFR 265.114;
- The date which the hazardous waste is placed in the storage area is clearly marked on the container, and the container is clearly marked as "Hazardous Waste";
- The facility complies with 40 CFR Part 265 Subpart C, Preparedness and Prevention (See Section 6.3.3 below);
- The facility complies with 40 CFR Part 265 Subpart D, Contingency Plan and Emergency Procedures (See Section 6.3.4);
- The facility complies with 40 CFR Part 265.16 training requirements (See Section 6.6 below);
- Any hazardous wastes which are stored longer than 90 days must first be granted an extension by EPA (or authorized state).

90-Day Storage Area Container Requirements (40 CFR Part 265 Subpart I)

Hazardous waste stored in containers must meet the following requirements:

- Containers must be in good condition, free of leaks;
- Hazardous wastes must be compatible with container (or liner) material;
- Containers must always be kept closed except to add or remove wastes;

- Containers must be handled in a manner to avoid ruptures;
- The storage area must be inspected at least weekly to check for container deterioration; and
- Incompatible wastes must be stored separately with separate secondary containment.

Incompatible wastes are wastes that are unsuitable for co-mingling because the co-mingling could result in any of the following:

- Extreme heat or pressure generation;
- Fire;
- Explosion or violent reaction;
- Formation of substances that have the potential to react violently;
- Formation of toxic dusts, mists, fumes, gases, or other chemicals; and/or
- Volatization of ignitable or toxic chemicals due to heat generation.

90-Day Storage Area Tank Requirements (40 CFR Subpart J)

LQGs that accumulate or store hazardous wastes in tanks or tank systems must meet the following requirements:

- For tanks existing prior to July 14, 1986, an assessment of tank must be performed and certified by an independent, qualified, licensed engineer. The written certification must be kept on file at the facility (40 CFR 265.191);
- New tank systems (those built after July 14, 1986) must meet tank technical standards and have been certified by an independent, qualified, licensed engineer. The written certification must be kept on file at the facility (40 CFR 265.192);

- New tank systems must have adequate secondary containment and leak detection systems. Existing tanks must be upgraded to meet these standards by the time the tank is 15 years of age (40 CFR 265.193);
- Tanks must be operated to prevent system failure, overflow and spills. Tanks must be operated with sufficient freeboard to prevent overtopping (40 CFR 265.194);
- Inspect the tanks at least once each operating day for the following:
  - Discharge control equipment;
  - Monitoring equipment and controls;
  - Tank level; and
  - Evidence of leaks or spills. (40 CFR 265.195)
- Inspect the tanks at least weekly for corrosion, erosion or leaks;
  - The tank must meet the closure and post-closure care provisions of 40 CFR 265.197; and
  - Store incompatible wastes separately (40 CFR 265.199).

Satellite Accumulation Station (SAS) Requirements (40 CFR 262.34(c))

A SAS is a container placed at or near the point of waste generation for the purpose of collecting the waste as it is being generated. For example, a container may be placed in the quality control laboratory for collection of hazardous wastes generated in the laboratory. This SAS may collect up to 55 gallons of hazardous waste or 1 quart of acute hazardous waste. The SAS does not need to meet the requirements of a storage area, provided the following conditions are met:

- The amount of hazardous waste accumulated at the SAS does not exceed 55 gallons (or 1 quart of acute hazardous waste);

- The SAS is located at or near the point of generation where the waste is initially accumulated and is under the control of the operator of the process generating the waste;
- The container used is in good condition, is compatible with the wastes being accumulated, and is kept closed except to add or remove wastes;
- The container is marked with the words "Hazardous Waste" or other words to identify the contents; and
- Once the 55-gallon limit is reached, the date is marked on the container and the container is moved from the SAS within three days to a proper location. For example, the wastes must either be moved to the storage area or be picked up by a waste transporter and moved off-site.

7.3.3 Preparedness and Prevention (40 CFR Part 265 Subpart C)

The following preparedness and prevention steps must be taken concerning the hazardous waste storage area:

- The storage area must be operated and maintained to minimize the possibility of fire, explosions or releases of hazardous waste;
- The facility must have appropriate communication systems, fire-fighting equipment, spill control equipment and decontamination equipment;
- All emergency response systems and equipment must be tested monthly with documentation and maintained to assure proper operation;
- Persons handling hazardous wastes must have immediate access to alarms and/or communication systems;
- The storage area shall have adequate aisle space for emergency response activities; and

- The facility must attempt to make arrangements with the local police, fire departments, emergency response teams, and local hospitals to assure readiness for potential emergencies associated with the storage area.

7.3.4 Contingency Plan and Emergency Procedures (40 CFR Subpart D)

A LQG that accumulates or stores hazardous waste on site in a 90-day storage area must develop and keep current a contingency plan for the facility. The purpose of the contingency plan is to provide an organized plan of action and delegation of responsibilities and authority to specific facility personnel to respond to emergency situations that may require both the facility and/or outside resources. The contingency plan is designed to minimize hazards to humans or the environment from fires, explosion or any unplanned sudden or non-sudden release of hazardous waste/hazardous waste constituent to air, soil or surface water in compliance with the requirements of 40 CFR 265 Subpart D. A Contingency Plan will be maintained on the site if hazardous IDW are accumulated on-site.

The key components of the contingency plan include the following (40 CFR 265.52):

- A description of the emergency response organization, including designation of the Emergency Coordinator and alternates;
- Response procedures;
- Emergency notification;
- Arrangements with local authorities;
- List of names, addresses and phone numbers of designated emergency personnel and alternates;
- List of emergency response communication equipment and locations;
- Evacuation procedures, routes and alternates; and
- Procedures for amending the plan.

Copies of the plan must be sent to (40 CFR 265.53):

- The Project Manager;
- Lincoln County Sheriff's department;
- Libby fire department; and
- Other agencies as deemed appropriate.

The emergency coordinator (EC) is the key person facilitating emergency preparedness and response. The EC or designated alternate shall be on-site or on-call at all times. The EC and alternates must be trained and thoroughly familiar with the contingency plan, emergency response activities and operation of the facility. The EC must know the locations and characteristics of all waste generated, location of all records within the facility and the facility layout. The EC must have the authority to commit the resources needed to carry out the spill response plan. Any person or department who first discovers any spill of a hazardous waste/material is responsible for notifying the spill response/emergency response coordinator. The EC for the Libby Mine Site field investigations will be the EHS Officer with the Field Team Leader and the Project Manager as alternates.

The contingency plan should be reviewed and immediately amended when:

- Changes in applicable regulations occur;
- The plan fails in an emergency;
- Changes are made to emergency procedures;
- Changes occur in emergency personnel list; or
- Changes occur in emergency equipment list.

7.4 Pre-Transportation Requirements

Prior to transporting hazardous wastes or offering hazardous wastes for transportation off-site, the generator must comply with the following:

- Package the hazardous wastes in DOT-approved containers per 49 CFR Parts 173, 178 and 179. DOT-approved containers (such as drums) are usually marked as being DOT-approved);
- Label the hazardous wastes according to DOT labeling requirements per 49 CFR Part 172;
- Mark each container (of 110 gallons or less) used in transportation with the following:

  HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the EPA.

  - Generator's Name and Address
  - Manifest Document Number
- Ensure that the initial transporter placards the transport vehicle with the appropriate placard in accordance with 49 CFR Part 172 Subpart F.

7.5 Manifesting Off-Site Shipments of Hazardous IDW

Any generator which transports or offers for transportation hazardous waste for off-site treatment, storage or disposal must prepare a manifest according to manifest instructions for each shipment of similar hazardous wastes. The manifest must be carefully filled out with each shipment. Take care to follow the instructions and use the terms as listed in the instructions. A generator must designate on the manifest one facility (designated facility) which is permitted to handle the waste described on the manifest (40 CFR 262.20).

The generator must determine if the state to which the wastes are destined (consignment state) requires use of its own manifest. If so, then the consignment state's manifest must be used. If the consignment state does not require use of its manifest, and the state in which the waste

shipment originates (generator state) does, then the manifest from the generator state must be used. If both states have manifests, use the consignment state manifest, making sure that there are sufficient copies to meet the generator state distribution requirements. If neither state requires use of its manifest, then any uniform hazardous waste manifest may be used (40 CFR 262.21).

The manifest must contain at least enough copies such that the generator gets two copies, the transporter gets one copy and the designated facility gets one copy. Some states require additional copies to be sent to the state. At the time of shipment, the generator must keep one copy (the generator copy) of the completed, signed manifest and give the remaining copies to the transporter. Each copy must have the signature of the generator and the transporter at the time of shipment. The original manifest shall be returned to the generator once the shipment reaches the designated facility and the manifest is signed by the designated facility (40 CFR 262.21).

If the original, signed manifest is not received by the generator within a certain number of days, action by the generator is required. These requirements are discussed in the following sections:

- If, after 35 days from the date of shipment, the original manifest copy is not yet received by the LQG, the LQG must contact the transporter and/or the designated disposal facility to determine the status of the hazardous waste (40 CFR 262.42(a)(1)).
- If after 45 days from the date of shipment, the original manifest copy is not yet received by the LQG, the LQG must submit an exception report to the U.S. EPA (or authorized state). The exception report must include a copy of the manifest along with an explanation of efforts to locate the hazardous wastes and the result of these efforts (40 CFR 262.42(a)(2)).

7.6 Personnel Training

Any person, and their immediate supervisor(s), involved in waste management at a LQG facility which stores hazardous waste in a 90-day storage area must undergo initial and annual training

for hazardous waste management (40 CFR 262.34(a)(4) and 40 CFR 265.16). Facility personnel are required to successfully complete a program of classroom instruction or on-the-job training that teaches them to perform hazardous waste management duties relevant to their jobs. The program must be directed by a person trained in hazardous waste management procedures.

The training must be designed to enable personnel to effectively respond to emergencies by becoming familiar with emergency procedures, emergency equipment and emergency systems, including the following;

- Procedures for using, inspecting, repairing and replacing facility emergency and monitoring equipment;
- Communications or alarm systems;
- Response to fires or explosions; and
- Off-site communication.

Employee training is to be held at regular intervals. Emergency planning information, e.g., the Contingency Plan, also should be provided to state and local emergency response agencies at regular intervals (40 CFR 265.37 and 265.53). Employees required to receive the training cannot work unsupervised until they have completed the training requirements (either classroom or on-the-job training). In addition, facility personnel must take part in an annual review of the initial training.

The following records must be maintained at the facility for employees affected by this training:

- Job title for each position and name of employee filling each job;
- Job descriptions for each position related to hazardous waste management;
- Written description of type and amount of initial and continuing training that will be given to each person filling the various job positions; and

- Documentation that necessary training has been given and completed by each affected personnel.

Training records are required to be kept on current personnel until closure of the facility. For former employees, training records must be kept for at least three years from the date the employee last worked at the facility and may be transferred if the employee stays within the same company (40 CFR 265.16(e).

7.7 Reporting and Recordkeeping

The following reports are required of a LQG:

- Manifest exception reports as discussed in Section 6.5 above.
- A LQG must submit a Biennial Report to the EPA (or authorized state) every even numbered year by March 1, e.g., March 1, 2008 for the 2007 reporting year. The Biennial Report is to be submitted on EPA form 8700-13A.

The following records are required to be kept for a minimum of three years by the LQG:

- The signed original manifests;
- Biennial reports;
- Exception reports;
- All records pertaining to hazardous waste determinations; and
- Land disposal determination records, notification and certification records.

8.0 QUALITY ASSURANCE AND QUALITY CONTROL

All IDW data must be documented in the field logbooks, field forms, manifests, including rationales deviations from this SOP. The Field Team Leader or designated QA reviewer will

check and verify that IDW documentation has been completed per this procedure and other procedures referenced herein.

9.0 REFERENCES

Agency for Toxic Substances and Disease Registry. 2006. Asbestos Exposure and Your Health.

EPA, 1991. Management of Investigation-Derived Wastes During Site Inspections, EPA May 1991, EPA/540/G-91/009

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Date: November 20, 2007 SOP TREE-LIBBY-OU3 (Rev. 1)

Title: SAMPLING AND ANALYSIS OF TREE BARK FOR ASBESTOS

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
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SOP Author	William Brattin, SRC	11/20/07

Revision Number	Date	Reason for Revision
0	09/26/2007	--
1	11/20/2007	Modify procedure for sample preparation based on results of pilot-scale laboratory tests

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for collection and analysis of tree bark samples for asbestos. This procedure will be used by USEPA Region 8 for the Remedial Investigation work for Operable Unit 3 performed at the Libby Asbestos Superfund site.

2.0 RESPONSIBILITIES

The Field Sampling Team Leader is responsible for ensuring that all bark samples are collected in accord with this SOP. The Laboratory Director is responsible for ensuring that bark samples provided to the laboratory for evaluation by this SOP are prepared and analyzed in accord with the requirements of this SOP. It is the responsibility of the Field Sampling Team Leader and the Laboratory Director to communicate the need for any deviations from the SOP with the appropriate USEPA Region 8 Remedial Project Manager or Regional Chemist.

3. 0 EQUIPMENT

3.1 Field Equipment

- hole saw (2-inch diameter)
- battery-powered drill
- ½ inch chisel
- flathead screwdriver
- aerosol hair spray
- Ziploc plastic bags
- sample identification tags
- decontamination supplies
- trash bag
- GPS unit
- digital camera
- flagging tape or metal identification tag
- field log book
- field sample data sheet(s) for tree bark
- increment boring device (e.g., Hagloff)
- plastic sheath for age core
- ink pen
- clear packaging tape

3.2 Laboratory Equipment /Reagents

- Disposable Filter funnels with Straight sides. VWR # 145-0020
- Culture Dishes. VWR # 25388-581 (case of 500)
- 47 mm 0.45 micron mixed cellulose ester (MCE) filters
- Glass Petri Dishes

- Glass microscope slides
- Low Temperature Plasma Asher
- Vacuum Evaporator (Carbon Coater)
- Graphite or Carbon rods
- HEPA Laminar Flow Hood
- Acetone Vapor Generator
- Grids
- Fine Forceps
- Grid Clips and Grid Storage Boxes
- Jaffe Wick or Sponge
- Kim wipes or alternative paper
- Transmission Electron Microscope with the following capabilities:
  - 100 Kev
  - fine probe size <250 nm
  - elemental Chemistry via X-Ray Detector
- Large ceramic crucibles (approx. 50 ml capacity or greater)
- Glass stirring rods
- Fumehood
- HEPA filtered Hood
- Ultrasonic Bath producing a rate of energy deposition in the range of 0.08-0.12 MW/m^3
- Disposable plastic filter funnel apparatus
- Reagent Grade or better Acetone
- Reagent Grade or better HCl

4.0 METHOD SUMMARY

One or more tree bark samples are obtained from selected trees by using a 2-inch hole saw to cut a circular ring in the bark, following by cutting/prying the circular piece of bark from the tree using a sharp chisel. The area to be sampled is sprayed with hair spray prior to sample collection in order to minimize the potential for loss of fibers from the tree bark. In some cases, a core may be obtained from the tree in order to allow verification of the age of the tree.

Tree bark samples are prepared for analysis by high temperature ashing to remove organic matter. The residue is then treated with HCl to dissolve any salts or carbonate component that may be present and applied to a filter which is examined for asbestos using transmission electron microscopy (TEM).

5.0 SAMPLE COLLECTION

Bark samples should be collected from the sampling stations specified in the Sampling and Analysis Plan (SAP). At each specified sampling station, sample collection should be performed as follows:

5.1 Select Tree

The species and size of tree selected for sampling should be specified in the project-specific sampling and analysis plan. In the absence of specification, the tree selected for sampling should be a Douglas fir (*Pseudotsuga menziesii*) with a diameter (caliper) of about 8-10 inches. If there are multiple trees that meet these requirements in the vicinity of the sampling station, preference should be given to trees with rough bark, and trees that are in open areas.

5.2 Bark Collection

Collect the bark sample from the side of tree facing the mine and from a height of 4-5 feet above the ground.

Steps:

1. Spray the bark collection area with aerosol hairspray and allow to dry.
2. Use a 2-inch diameter hole saw and a battery-powered electric drill to cut a circle in the tree bark. Continue cutting until sawdust changes from red to cream, which indicates that the cambium has been reached (about ½ inch deep).
3. Using a sharp ½-inch metal chisel or flathead screwdriver, cut or pry the circular bark sample off the tree, attempting to maintain the sample in one piece.
4. Place the bark sample in a plastic Ziploc bag.
5. Label the bag with a unique sample identifier.
6. Place clear packaging tape over the sample identifier label.

5.3 Tree Age Core Collection

At locations where an age core is to be collected (as specified in the project-specific sampling and analysis plan), collect a core from the tree using a Hagloff manual increment borer or similar device. Place the core in a plastic straw. Crimp and tape the ends of the straw, and label the straw with the same sample identifier as the bark field sample. Place the straw into a Ziploc bag. Label the bag with the same sample identifier as the bark field sample, and place clear packaging tape over the sample identifier label.

5.4 Field Documentation

Complete the Tree Bark Field Sample Data Sheet (FSDS) form. Measure and record the diameter of the tree. Obtain and record the GPS coordinates of the tree on the Tree Bark FSDS. Mark the tree with flagging tape or a metal identification tag.

5.5 Equipment Decontamination

If dedicated sample equipment is not used, after each sample collection, manually remove any fibrous debris from the hole saw teeth. If resin or pitch is present, use WD40 to clear saw of any residue. Thoroughly clean all collection equipment with isopropyl alcohol wipes. Dry sampling equipment using paper towels. Any spent wipes, paper towels, or other decontamination waste materials must be disposed or stored properly as investigation-derived waste.

6.0 SAMPLE PREPARATION AND ANALYSIS

6.1 Tree Bark Preparation

Drying and Ashing

Measure and record the diameter and the thickness of the tree bark sample to an accuracy of ± 2 mm (about 1/16 of an inch).

Weigh and record the tare weight of a clean crucible. Add the entire tree bark core to the crucible. Place the crucible with bark sample in a drying oven. Heat to 80°C and hold at this temperature until weight stabilizes (at least 6 hours). Record the final weight and calculate the mass of the dried tree bark sample by difference.

Place a lid on the crucible and transfer to a muffle furnace. Ramp up the furnace from a cold start to 450°C. Hold at this temperature for 18 hours or until all organic matter is removed. Allow the crucible to cool. Remove crucible lid and weigh and record the mass of the crucible plus ashed residue. Calculate the mass of the ashed residue by difference.

Acid Treatment

To the ashed residue, add just enough filtered and deionized (FDI) water (approximately 1-2 mL) to cover the surface of the residue. Slowly add approximately 10-20 mL concentrated HCl to the wetted ash. Typically a visible effervescing is observed. Add the HCl slowly to keep this reaction controlled. A small glass stirring rod is useful at this point to gently stir the ash and expose all material to the acid.

If after 3-5 minutes there is no further visible reaction, proceed to the next step. If bubbling is still occurring, continue observation and gentle stirring for up to an additional 5 minutes.

Dilute the sample by adding FDI water directly to the crucible (approximately 20 mL) using a squirt bottle. Pour the sample into an unused disposable 100 mL specimen container with lid. Rinse out any remaining residue from the crucible into the specimen container. Do not exceed 100 mL total volume. Bring the total volume to 100 ml with FDI water.

Cap the specimen jar and agitate the sample by inversion 5 or 6 times. Loosen the cap slightly and sonicate for 2 minutes. After sonication, tighten the cap and then dry the exterior of the specimen container with kim wipe or equivalent.

Filtration

Agitate the sample by inversion 5 or 6 times. Withdraw an initial aliquot of 5 to 20 mL of sonicated sample. Transfer this aliquot into a new disposable specimen container with lid. Bring the volume up to approximately 100 mL with FDI water. Cap and agitate by inversion (5 or 6 times).

Filter this entire volume onto a 47 mm mixed cellulose ester (MCE) filter with 0.4 um pore size.

If the filter appears overloaded (overall particulate level > 20%), repeat the process above, selecting a smaller aliquot volume, as suggested by the degree of overloading. Likewise, if the filter looks too lightly loaded, remove and filter a larger aliquot.

Transfer the filter membranes to individual disposable labeled Petri dishes with lids. With the Petri dish covers ajar, dry the filters by air drying.

6.2 TEM Examination

Prepare 3 grids for TEM analysis as detailed in International Organization for Standardization (ISO) TEM method 10312, also known as ISO 10312:1995(E). Utilize 2 grids for analysis, and archive 1 grid.

Counting rules

Examine the grids using TEM in accord with ISO 10312, with all relevant Libby site-specific modifications, including utilizing the most recent version of all relevant project specific modifications, including LB-000016, LB-000019, LB-000028, LB-000029, LB-000030, LB-000053, and LB-000066. All fibrous amphibole structures that have appropriate Selective Area Electron Diffraction (SAED) patterns and Energy Dispersive X-Ray Analysis (EDXA) spectra, and having length greater than or equal to 0.5 um and an aspect ratio (length:width) ≥ 3:1, will be recorded on the Libby site-specific laboratory bench sheets. Data recording for chrysotile (if observed) is not required.

Stopping rules

The target analytical sensitivity for sample analysis should be specified in the SAP. In the absence of such specification, the target sensitivity should be no higher than 100,000 cm^{-2}. The analytical sensitivity is calculated using the following equation:

$$S = \frac{EFA}{GO \cdot Ago \cdot A \cdot F}$$

where:

S	=	Sensitivity (cm^{-2})
EFA	=	Effective filter area (mm^2)
GO	=	Number of grid openings counted
Ago	=	Area of one grid opening (mm^2)
A	=	Area of tree bark sample being analyzed (cm^2)
F	=	Fraction of original sample deposited on the filter

Count the sample until one of the following occurs:

- The target sensitivity is achieved.
- A total of 50 or more LA structures are observed. In this case, counting may cease after completion of the grid opening that contains the 50th LA structure.
- A total of 100 grid openings are counted without reaching the target sensitivity or observing 50 LA structures. In this event, the laboratory should contact EPA asking for direction.

6.3 Electronic Data Deliverable

All data on the number, type and size of LA fibers collected in the laboratory will be provided as an electronic data deliverable (EDD) using the most recent version of the spreadsheet developed for this purpose ("TEM Tree Bark.xls").

6.4 Analysis of Core Sample

The age of the tree will be determined from the core sample in accord with the method of Phipps (1985).

7.0 QUALITY ASSURANCE

7.1 Field-Based Quality Assurance

Field Duplicates

Field duplicate tree bark samples will be collected at a frequency specified in the SAP. Each field duplicate should be collected from the same tree at a location no further than 6 inches away from the original bark sample. In the absence of such specification, the rate should be no less than 5%. Field duplicate samples should be labeled with a unique identifier. Sample details should be recorded on the Tree Bark FSDS, including the unique identifier of the "parent" field sample.

Equipment Rinsates

If dedicated sampling equipment is not utilized, equipment rinsates should be collected after decontamination of field equipment as described above. The decontaminated equipment (hole saw, chisel) should be rinsed with about 25 mL filtered and deionized water into a glass container. The frequency of rinsate collection should be specified in the SAP. In the absence of such specification, one rinsate sample should be collected per sampling team per day. Equipment rinsate samples should be labeled with a unique identifier. Sample details should be recorded on the Surface Water FSDS.

7.2 Laboratory-Based Quality Assurance

Laboratory Blanks

A laboratory blank is a filter that is prepared by processing a clean crucible in the same way that a bark sample is prepared. That is, a clean crucible in placed in the oven (with the sample set) at the

same time that tree-bark samples are undergoing ashing. After ashing, the blank crucible is treated by addition of water and HCl, as described above. The contents of the crucible are then rinsed out, diluted to 100 mL, and an aliquot at least as large as the highest volume aliquot for the sample set is removed and used to prepare a filter for TEM examination. This type of blank is intended to indicate if contamination is occurring at any stage of the sample preparation procedure.

Laboratory blanks should be prepared at a rate specified in the project-specific sampling and analysis plan. In the absence of a project-specific specification, laboratory blanks should be prepared at a rate of 3%.

Filtration Blanks

A filtration blank is a clean filter that is prepared by passing 100 mL of laboratory FDI water through it. The purpose of this type of blank is to ensure that the filters are not contaminated in the laboratory, and that fluids used for diluting and processing samples are fiber-free.

Filtration blanks should be prepared at a rate specified in the project-specific sampling and analysis plan. In the absence of a project-specific specification, filtration blanks should be prepared at a rate of 2%.

Laboratory Duplicates

Laboratory duplicates will be prepared by applying a second aliquot of ashed residue suspension to a new filter, which is then prepared and analyzed in the same fashion as the original filter. The frequency of laboratory duplicates should be specified in the SAP. In the absence of such specification, the rate should be no less than 5%. Laboratory duplicates should be recorded using the appropriate laboratory quality control field in the TEM EDD spreadsheet.

Recounts

The precision of TEM sample results should be evaluated by recounting selected grid openings in accord with the requirements specified in the most recent version of LB-000029.

8.0 REFERENCES

International Organization for Standardization. 1995. Ambient Air – Determination of asbestos fibres – Direct-transfer transmission electron microscopy method. ISO 10312:1995(E).

Phipps, R.L. 1985. Collecting, Preparing, Cross-dating and Measuring Tree Increment Cores. U.S. Geological Survey Water Resources Investigations Report 85-4148

Ward TJ, T Spear, J Hart, C Noonan, A Holman, M Getman, and JS Webber. 2006. Trees as Reservoirs for Amphibole Fibers in Libby, Montana. Science of the Total Environment 367: 460-465.

Date: June 14, 2010 SOP ABS-LIBBY-OU3 (Rev. 0)

Title: ACTIVITY-BASED SAMPLING FOR ASBESTOS

APPROVALS:

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Remedial Project Manager	Bonita Lavelle, USEPA RPM	6/14/10
SOP Author	Lynn Woodbury, SRC	6/14/10

Revision No.	Date	Reason for Revision
0	06/14/2010	--

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for collection of air samples during activity-based sampling (ABS) for Libby amphibole asbestos (LA). This SOP was developed based on procedures provided in ERT SOP #2084 (Rev 0) *Activity-Based Sampling for Asbestos* and Libby SOP EPA-LIBBY-01 (Rev 1) *Sampling for Asbestos Fibers in Air*.

This procedure will be used by USEPA Region 8 for the Remedial Investigation work for Operable Unit 3 (OU3) performed at the Libby Asbestos Superfund site.

2.0 RESPONSIBILITIES

All staff involved with the collection of ABS air samples are responsible for understanding and implementing the requirements contained herein as well as other related project-specific requirements.

Team Leader – The team leader is responsible for communication with EPA regarding status and progress of the sampling event and providing support to field team staff to ensure all necessary resources are available for implementation of the ABS program.

Field Team Leader (FTL) – The FTL is responsible for ensuring that the specifics related to the ABS program described in this procedure are followed by all staff and that all quality assurance/quality control (QA/QC) procedures related to this program are implemented.

Field Team Members – The field team members are responsible collection and documentation of samples as described in the applicable Sampling and Analysis Plan (SAP) and this SOP.

3.0 METHOD SUMMARY

At present, models are not available to accurately predict asbestos exposure in air that result from disturbance of an LA-contaminated source based only on measures of LA in the source (e.g., soil). Therefore, personal monitoring in the form of ABS is the most appropriate technique to estimate exposure (USEPA 2008). As part of ABS, USEPA or contractor personnel trained in hazard recognition and mitigation, serve as surrogates for the potentially exposed populace of interest. ABS simulates particular activities in order to mimic and evaluate or predict personal exposures from disturbance of materials potentially contaminated with asbestos. Air is drawn through a fine-pore filter in order to trap any suspended particulate material in the air, including suspended asbestos fibers. ABS air samples are collected from the breathing zone of the subject at an appropriate air flow rate. These filters are then examined using an appropriate microscopic technique to observe, characterize, and quantify the number of asbestos fibers on the filter. Air filters collected in this way are suitable for examination by a variety of microscopic techniques, including transmission electron microscopy (TEM), phase contrast microscopy (PCM), and scanning electron microscopy (SEM).

4.0 FIELD EQUIPMENT

- Personal sampling pump – The selected sampling pump will be capable of a flow-rate and pumping times sufficient to achieve the desired air sample volume. The sampling pump will provide a non-fluctuating air-flow through the filter, and will maintain the initial volume flow-rate to within ±10% throughout the sampling period. For personal air sampling, a portable high volume AC powered sampler or low volume battery-operated pump are acceptable, depending on whether the activities of the individual are impaired by the tethering imposed by the power cord needed for the high volume pump.

- Filter cassettes – A commercially available, 25-millimeter (mm), three-piece cassette with a 50 mm electrically-conductive extension cowl pre-loaded with a 0.8 micrometer (µm) mixed cellulous ester (MCE) filter.

- Inert tubing – Tygon tubing used in the sampling train to connect the outflow end of the sample cassette to the sampling pump. Tubing has a 1/4" inner diameter and 7/16" outer diameter.

- Rotameter – A rotameter calibrated such that the operator can measure flow rates to ±5% accuracy at the expected sampling flow rate.

- Rotameter calibration source – A bubble buret or other primary calibration standard may be used to calibrate the rotameter.

- Field sample data sheets (FSDS) – Specific data related to the collection of each sample will be recorded on an OU3-specific ABS air FSDS (see Attachment 1). This sheet will contain all relevant information regarding equipment used, flow rates, and collection times.

- Chain of custody (COC) forms – Documentation of chain of custody signatures/dates and requested analyses for each sample collected will be recorded on an OU3-specific COC form.

- Field logbook

- Spring clips

- Plastic bags

- Sample labels

- Clear packaging tape

- Ink pen

- Personal protective equipment (PPE)

- Power sources (e.g., batteries, power inverters, generators)
- Miscellaneous tools (e.g., screwdriver, pliers, scissors)

5.0 REAGENTS

Reagents are not required for the collection or preservation of asbestos air samples.

6.0 SAMPLING PROCEDURES

6.1 Identification of ABS Areas

When selecting areas for ABS, consideration should be given to the potential for off-site migration of contaminants and possible exposure of the public. Within the constraints of ABS, to the degree practical, particulate generation migration off-site should be minimized, and constraints or mitigation protocols established to eliminate public exposure.

6.2 Selection of Air Volumes and Flow Rates

Target air volumes and flow rates will be specified in the applicable SAP. For activities that generate a large quantity of dust, flow rates and sample times may be adjusted to ensure the sample filter has proper loading for the required analytical analysis and sensitivity goals.

While high flow rate are desirable because they increase the volume of air sampled, high flow rates may result in filter damage due to failure of its physical support associated with increased pressure drop, leakage of air around the filter mount so that the filter is bypassed or damage to the asbestos structures (e.g., breakup of bundles and clusters) due to increased impact velocities (ISO 10312). High flow rates can also tear the filters during initial pump startup due to the shock load placed on the filter when the pump is first started.

In no event shall a sample be collected at a flow rate lower than 0.92 L/min, since the linear flow velocity would fall below 4 cm/sec, which is the minimum velocity specified by ISO 10312.

6.3 Sample Collection

There are a variety of ABS activities that can be performed (e.g., ATV riding, raking, jogging). The specific ABS activity to be performed will be specified in the appropriate SAP. The SAP should include a detailed ABS “script” of these activities.

For all ABS events, except as noted otherwise, air samples will be collected from the breathing zone of the event participants. The breathing zone can be visualized as a hemisphere approximately 6 to 9 inches around an individual’s face. Breathing zone samples provide the best approximation of the concentration of contaminants in the air that an individual is actually breathing. Specific breathing zone heights should be determined on a project-by-project basis.

ABS air samples should be collected as follows:

1. Place a sample label on the sample cassette indicating the unique Index ID.

2. Secure the cassette on the lapel just below the face of the individual being monitored using spring clips. Orient the cassette so the open face of the cowel is pointing downward to avoid any particles entering the filter by precipitation.

3. Remove the protective cap over the open face of the cowel and turn on the calibrated pump. Store cassette covers and end plugs in a clean area (e.g., closed bag) during the sampling period).

4. Record the starting time, initial flow rate, and all other relevant sample information on the appropriate FSDS form.

5. Perform the ABS activity in accordance with the script specified in the appropriate SAP.

6. For sampling events that last longer than 2 hours, perform a check of the filter cassette and flow rate every 2 hours. During this check,

   -inspect the filter cassette to ensure that it has not been disturbed
   -inspect the filter for overloading and particle deposition (note: if particle deposition is observed on the inside of the cowl, it may be necessary to ground the cowl to reduce static charge)
   -check the pump flow rate (see Section 7.3 below)

7. After the sampling period has elapsed, measure the end time and ending flow rate on the appropriate FSDS form.

8. Turn off the pump and remove the cassette from the pump.

9. Attach and secure a sample seal around each sample cassette in such a way as to assure that the end cap and base plug cannot be removed. Tape the end of the seal together and initial/date the seal.

10. Place each sample cassette in a plastic sample bag. Each bag should be marked with the same Index ID as the sample cassette. Place clear packaging tape over the sample identification label.

If it is necessary to relieve a participant from the activity, another sample collector should be suited and ready to participate in the ABS prior to the personnel exchange. The participant will stop the activity, remove any sampling apparatus, and pass it to the relief participant. The original participant will assist the relief participant with donning the sampling apparatus. If the exchange is anticipated to take less than 60 seconds, the sampling pumps and event time clock will not be halted during the exchange. If the exchange requires more than 60 seconds, the pump and event clock will be stopped until activity is reinitiated.

6.4 Sample Handling and Storage

Place a sample label on the cassette indicating a unique sampling number. Do not put sampling cassettes in shirt or coat pockets as the filter can pick up fibers or a static charge that could disturb the dust deposited on the filter media.

Samples must be handled gently with the filter inlet facing upward to avoid disturbing the particulate deposited on the filter and to minimize the potential of imparting a static charge to the cassette, which might alter the particulate deposition on the filter media.

To the best extent possible, the sampling cassettes should be placed right side up so that the cassette inlet cap is on top and cassette base is on bottom. Place samples into a shipping container and use enough packing material to prevent jostling or damage. Samples must be handled gently so as not to disturb the dust deposited on the filter media. Do not use vermiculite or any other type of fibrous packing material for samples.

Ship the cassettes to the analytical laboratory under COC procedures.

7.0 CALIBRATION PROCEDURES

Each sampling pump will be calibrated before the start of each air sample collection event. This is to ensure that each sampling pump is measuring the flow rate or volume of air correctly.

7.1 Calibration of Rotameter with an Electronic Calibrator

Rotameters used for pump calibration are calibrated to a primary flow standard. Calibration of the rotameter to the primary flow standard shall occur once at the beginning of the sampling program, and quarterly thereafter as needed. Procedures for rotameter calibration with the primary flow standard meter are as follows:

1. If the electronic calibrator does not automatically adjust to account for temperature and pressure changes, obtain the actual temperature and pressure in Libby, MT from the local National Oceanic and Atmospheric Administration (NOAA) weather station or from temperature and weather reference centers. Record actual temperature and pressure in the fields provided on the Precision Rotameter Calibration Data Sheet (Attachment 2).
2. Set up the calibration train as shown in EPA SOP #2015 Figure 4 (Attachment 3) with the sampling pump, rotameter, and primary flow meter.
3. Hold the rotameter as vertical as possible.
4. Turn the primary flow standard and sampling pump on.
5. Adjust the pump until the desired flow rate is attained.
6. Calibrate rotameter to desired ball reading, as read from the middle of the flow ball. Record value in the Ball Reading column on the rotameter calibration data sheet.
7. Check adjusted flow rate of sample pump to the primary flow standard. Ten repetitive flow measurements will be averaged and that result recorded in the flow rate column for the selected interval.

8. Repeat this process at 10 intervals over the range of the precision rotameter.
9. Input data into rotameter calculation sheet to generate the corrected flow rate.

7.2 Calibration of Sampling Pump with a Rotameter

Prior to the start of each air sample collection event, each sampling pump will be calibrated with a rotameter that has been calibrated as described above. The procedures used for sampling pump calibration are as follows:

1. Set up the calibration chain as shown in EPA SOP #2015, Figure 5 (Attachment 3) using a rotameter, sampling pump and a representative sample cassette. The sample cassette to be used for sampling is installed between the pump and the calibrator.
2. To set up the calibration train, attach one end of tubing to the sample cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the sample cassette cap to the rotameter.
3. Hold the rotameter as vertical as possible.
4. Turn the sampling pump on.
5. Adjust the sampling pump until the middle of the float ball on the rotameter is lined up with the pre-calibrated flow rate value.
6. Each rotameter used for field calibration will be transported to and from each sampling location in a sealed zip-top plastic bag. The sample cassette cap and attached tubing for rotameter checks will be stored in the site enclosure in a plastic bag.

7.3 Adjustment of Flow Rates During Flow Checks

Flow checks will be performed every 2 hours during the ABS activity. During these checks, flow rates will be adjusted back to the target rate. Adjustment of flow rates during flow checks will be performed as described below. Should the flow rate change from the target flow rate, the following procedure will be used to make the adjustment:

1. Connect the rotameter as described in Section 7.2 steps 1 to 3.
2. Record the observed flow rate and time of observation.
3. Adjust the flow rate to the target flow.

Attachment 4 illustrates the volume tracking spreadsheet that will be used in the field to determine the time required for sample collection. Copies of all volume tracking spreadsheets will be provided to the project data manager at the conclusion of each sampling event. Electronic copies are suitable and will be placed in the project-specific FTP site within one week from completion of each sampling event.

8.0 CALCULATION OF AIR VOLUME

Air volume for a sample is calculated based on the flow rate and sample collection duration as follows:

Air Volume (L) = Flow Rate (L/min) A Sample Collection Duration (min)

The sample volume should be recorded on the COC form which is provided to the analytical laboratory. For lot blanks and field blanks, the associated air volume should be recorded as zero.

If the flow rate changes by more than 5% during the sampling period, the average of the pre- and post-sampling rates will be used to calculate the total sample volume. If at any time the measurement indicates that the flow-rate has decreased by more than 30%, sampling should be terminated. Depending on the type of sampling pump used, it may be possible to salvage the sample if sufficient volume was collected; however, it may not be representative of the time it takes for the actual activity to be completed. Depending on the type of sampling pump used, the actual sampling time in hours and minutes before the sampling fault may be displayed and an actual sample volume calculated. If the fault was due to battery failure, it may be possible to check the post-sampling flow.

9.0 QUALITY ASSURANCE / QUALITY CONTROL

Lot Blanks

Before sampling begins, two cassettes from each filter lot should be randomly selected and submitted for analysis. These lot blanks will be analyzed for asbestos by the same method as used for the field samples to ensure that cassettes are free from asbestos contamination. The area of the filter examined should be no less than 0.1 mm^2, unless specified otherwise in a project specific plan. If asbestos is detected in any lot blank, the entire cassette lot should be rejected for use.

Field Blanks

Field blanks are used to determine if any contamination has occurred during sample handling. A field blank is prepared by opening the filter cassette in the area where the field samples will be taken, and then closing and sealing the sample in a manner similar to the field samples. Field blanks should be assigned a unique Index ID. Field blanks will be collected at a frequency specified in the project-specific SAP. In the absence of such specification, the rate should be no less than 5%. The area of the filter examined should be no less than 0.1 mm^2, unless specified otherwise in a project specific plan.

Field Duplicates

Field duplicates are used to evaluate the sampling and analysis variability across air samples. Field duplicate air samples will be collected at a frequency specified in the project-specific SAP. In the absence of such specification, the rate should be no less than 5%. Each field duplicate will be a sample collected concomitantly with the field sample. Field duplicate samples should be labeled with a unique Index ID. Sample details should be recorded on the appropriate FSDS form, including the unique Index ID of the “parent” field sample.

10.0 HEALTH AND SAFETY

Inhalation of asbestos fibers is hazardous to human health. When working with potentially hazardous materials, personnel should follow USEPA, OSHA, and corporate health and safety procedures. For all ABS, appropriate PPE, including Tyvek coveralls, protective gloves and foot wear, and a respirator with HEPA filter cartridges (P-100 or equivalent) should be worn to protect participants. Details regarding PPE and other protective measures should be specified in the site-specific Health and Safety Plan (HASP). Special consideration should be given to the physical safety of the event participants as well as heat stress associated with performing vigorous activities in impermeable clothing.

11.0 REFERENCES

International Organization for Standardization. 1995. Ambient Air – Determination of asbestos fibres – Direct-transfer transmission electron microscopy method. ISO 10312:1995(E).

USEPA. 2008. Framework for Investigating Asbestos-Contaminated Sites. Report prepared by the Asbestos Committee of the Technical Review Workgroup of the Office of Solid Waste and Emergency Response, U.S. Environmental protection Agency. OSWER Directive #9200.0-68. http://epa.gov/superfund/health/contaminants/asbestos/pdfs/framework_asbestos_guidance.pdf

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ATTACHMENT 1

FIELD SAMPLE DATA SHEET (FSDS) FOR ABS AIR SAMPLE COLLECTION

Sheet No.: P4-_____

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS) (rev 0)
PHASE IV-A ACTIVITY BASED SAMPLING (ABS)

Field Logbook No _____ Page Numbers _____

Location Identification _____

Sampling Team _____ Sampler Initials _____ GPS ID _____

Data Item		Cassette 1		Cassette 2		Cassette 3	
Index ID		*AFFIX LABEL HERE*		*AFFIX LABEL HERE*		*AFFIX LABEL HERE*	
Person (circle)		1	2	1	2	1	2
Scenario (see key below)							
Pump (circle)		HV	LV	HV	LV	HV	LV
Sample Type (circle)		Personal	Stationary	Personal	Stationary	Personal	Stationary
Field QC Type (circle)		FS - Field Sample FB - Field Blank Lot Blank		FS - Field Sample FB - Field Blank Lot Blank		FS - Field Sample FB - Field Blank Lot Blank	
Pump ID Number							
Rotameter ID Number							
		Start	Stop	Start	Stop	Start	Stop
Date (mm/dd/yy)							
First	Time (hh:mm)						
First	Flow (L/min)						
Second	Time (hh:mm)						
Second	Flow (L/min)						
Total Volume (L)							
Pump fault? (circle)		Yes	No	Yes	No	Yes	No
Field Comments Cassette Lot Number: _____							
Entered By (Provide initials):				**Validated By (Provide initials):**			

ABS Scenario Key:

Population	ABS Scenario	ABS Script	Population	ABS Scenario	ABS Script
Recreational visitor along Rainy Creek	Hiking along Rainy Creek	1	USFS Firefighter (ground-based)	Cutting firelines by hand	3d
Residential wood harvester	Driving to and from harvest area	2a		Cutting firelines with heavy equipment	3e
	Cutting and hauling firewood	2b		Personal monitors worn during simulated wildfire	4a
USFS Worker (forest management activities)	Trail maintenance	3a		Stationary monitors activated during simulated wildfire burns	4b
	Thinning trees	3b	USFS Firefighter (pilot of aircraft)	Fly through smoke from simulated wildfires	5a
	Stand exam	3c		Fly through smoke from authentic wildfires	5b

For Data Entry Completion (Provide Initials)	Completed by:	QC by:

ATTACHMENT 2

PRECISION ROTAMETER CALIBRATION DATA SHEET

Calibration Date: _____ Calibration By: _____
Rotameter ID: _____ Primary Standard ID: _____

If calibrator does not automatically adjust for temperature and pressure, specify –

Actual Temp (ºF): _____ Actual Pressure (in. Hg): _____

Ball Reading = Y (mid-ball)	Flow Rate = X_1 (L/min)
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Rotameter Calibration Procedure:

1. Obtain the actual temperature and actual pressure in Libby, MT from the MET station. If calibrator does not automatically adjust for temperature and pressure, record the actual temperature and actual pressure in the fields provided above.
2. Calibrated rotameter to desired ball reading with a sampling pump and cassette in-line. Cassette must be the same type and from the same lot of cassettes that will be used for sampling. Record value in Ball Reading column.
3. Check adjusted flow rate of sample pump to the Dry Cal flow calibrator primary flow standard. 10 repetitive flow measurements will be averaged and that result recorded in the Flow Rate column for the selected interval.
4. Repeat this process at 10 intervals over the range of the precision rotameter.
5. Input data into rotameter calculation sheet to generate the corrected flow rate.

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ATTACHMENT 3

CALIBRATION TRAIN FIGURES
(from EPA SOP #2015)

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FIGURE 4. Calibrating a Rotameter with a Bubble Meter

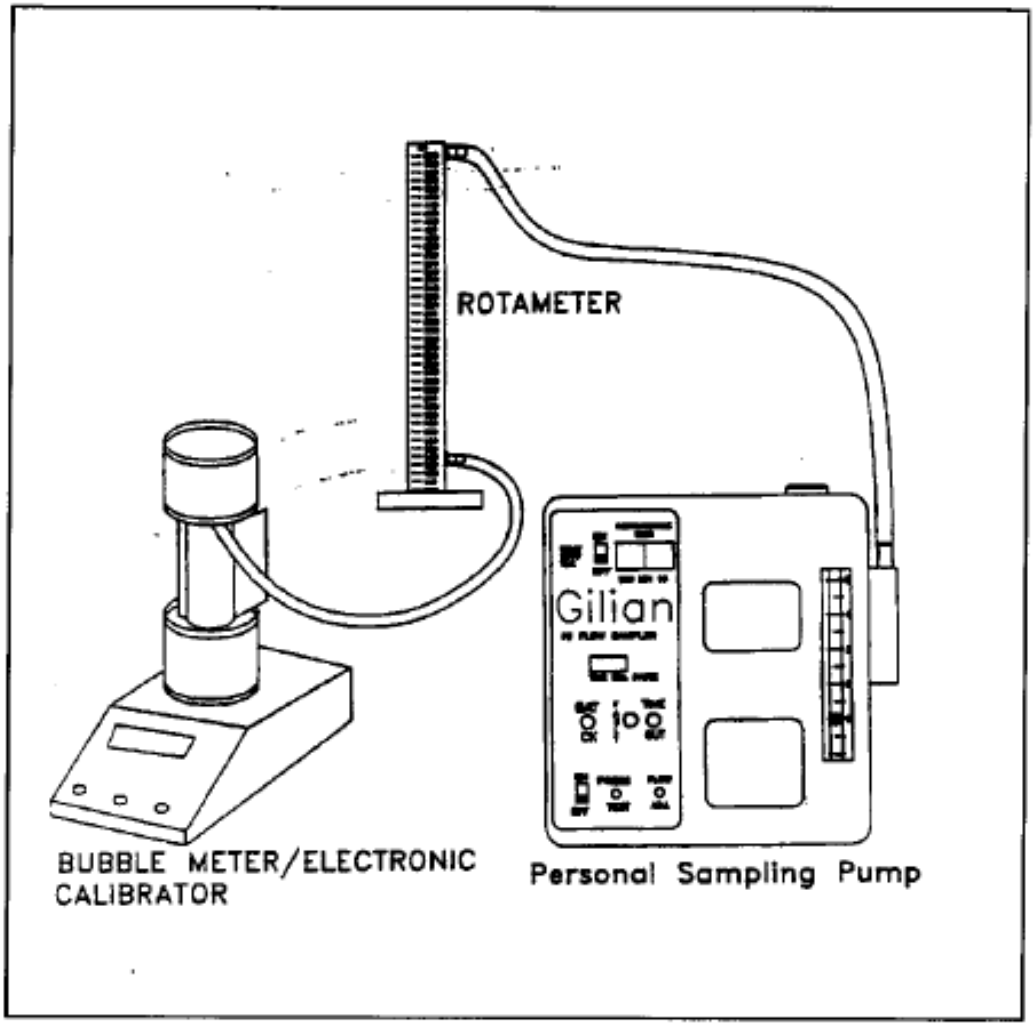
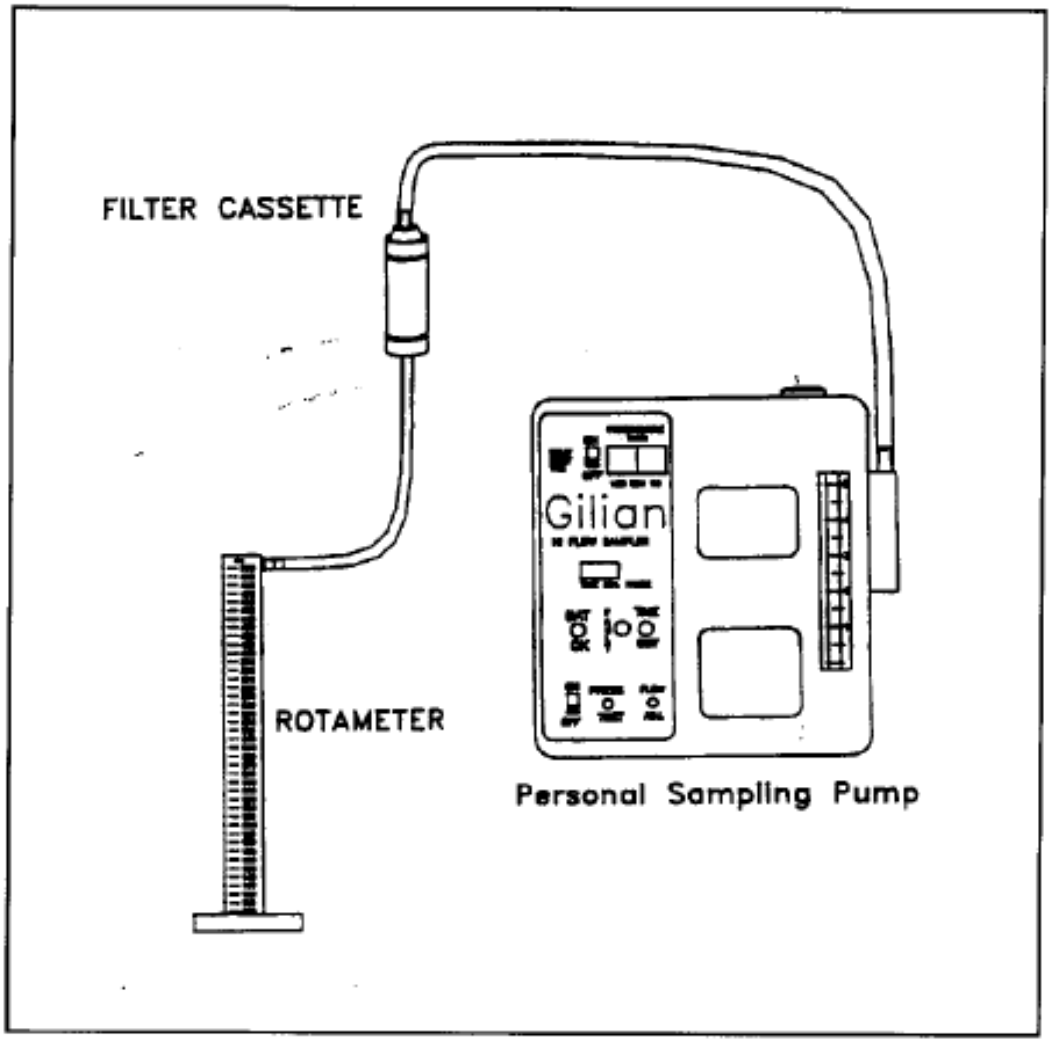


FIGURE 5. Calibrating a Sampling Pump with a Rotameter



ATTACHMENT 4
VOLUME TRACKING SPREADSHEET EXAMPLE

Index ID	Pump ID	Flow Meter	Pump Fault? (Yes/No)	Pump Comments	Start Information			Stop Information				Data Entry Checked by	Total Sample Volume (L)
					Date (mm/dd/yy)	Time (hh:mm)	Counter	Date (mm/dd/yy)	Time (hh:mm)	Counter	Flow (L/min)		
Example P4-00001	G-04897	677YHG	No	No issues encountered	08/01/07	8:00	1256.7	08/06/07	14:15	1456.8	1.8	CLW	**14,392**