June 14, 2010

REMEDIAL INVESTIGATION
FOR OPERABLE UNIT 3
LIBBY ASBESTOS SUPERFUND SITE

CONTINGENCY AIR MONITORING PLAN
DURING FOREST FIRES WITHIN OPERABLE UNIT 3

REVISION 1

Prepared by
U.S. Environmental Protection Agency
Region 8
Denver, CO

With Technical Assistance from:

SRC, Inc.
Denver, CO

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APPROVAL PAGE

The *Contingency Air Monitoring Plan During Forest Fires Within Operable Unit 3* of the Libby Asbestos Superfund Site is approved for implementation.

Bonita Lavelle
Remedial Project Manager, Libby OU3

6/14/10
Date

DOCUMENT REVISION LOG

Revision	Date	Primary Changes
0	08/11/09	--
1	06/14/10	Add mobile monitor downwind of fire

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1.0 INTRODUCTION

Studies performed to date as part of the Superfund Remedial Investigation (RI) for Operable Unit 3 (OU3) of the Libby Asbestos Superfund Site have revealed that soil, tree-bark, and duff in the vicinity of the former vermiculite mine have been impacted by historic releases of Libby amphibole asbestos (LA) (EPA 2008, EPA 2009). Forest fires that occur within contaminated areas of OU3 may result in the release of LA fibers into air although the magnitude of the release is unknown.

At present, no data are available on the concentration of LA fibers that may be released during fires in OU3. The purpose of this document is to present a plan for establishing air monitoring stations and for collecting air samples that will provide preliminary information on the levels of LA in ambient area that may occur in residential areas during forest fires in OU3 within the area designated as a Fire Suppression Restricted Zone (FSRZ) by the U.S. Forest Service (see yellow line in Figure 1). The resulting data may be useful in the RI for OU3 but the primary purpose of the data are to inform the general public and the U.S. Forest Service of air impacts from forest fires within OU3.

2.0 PROJECT MANAGEMENT AND ORGANIZATION

EPA is the lead regulatory agency for Superfund activities within OU3. The EPA Remedial Project Manager (RPM) for OU3 is Bonita Lavelle, EPA Region 8. Ms. Lavelle is a principal data user and decision-maker for Superfund activities within OU3.

The Montana Department of Environmental Quality (MDEQ) is the support regulatory agency for Superfund activities within OU3. The MDEQ Project Manager for OU3 is Dick Sloan. EPA will consult with MDEQ regarding all Superfund investigations and assessments within OU3, as provided for by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan, and other applicable guidance.

EPA has entered into an Administrative Order on Consent (AOC) with Respondents W.R. Grace & Co.-Conn. and Kootenai Development Corporation (KDC) to perform a Remedial Investigation/Feasibilty Study (RI/FS) within OU3. Although the data to be collected under this plan are not directly in support of the RI/FS for OU3, W.R. Grace & Co.-Conn. and KDC have agreed to implement this SAP. The designated Project Coordinator for Respondents W.R. Grace & Co.-Conn. and KDC is Robert Medler of Remedium Group, Inc.

3.0 DATA QUALITY OBJECTIVES

The key data quality objective for air samples collected under this project is to collect data that may be used to estimate exposure to residents and workers in Libby in the event that a wildfire in OU3 generates significant levels of smoke in the community. This objective will be achieved by collecting two types of data:

1. Stationary air samples will be collected in and about the community of Libby when smoke from a fire in OU3 is reaching the community. This type of data provides a direct measure of human exposure to LA in smoke. However, collection of these data is contingent upon the occurrence of a fire in OU3 that generates smoke that reaches the community.
2. Stationary air samples will be collected downwind of the fire (regardless of the direction that smoke is blowing). These data are valuable because the measured levels of LA in smoke can be used to model (predict) the levels of LA that would occur in Libby if the smoke were to be blown toward the community.

All samples collected as part of this program will be analyzed with an analytical detection limit that is sufficient to allow reliable detection and quantification of LA fibers if they were present at a level of concern in air. The basic equation for calculating the concentration of potential concern is as follows (USEPA 2008):

$$RBC = \frac{Target\ Risk}{TWF \cdot IUR_{a,d}}$$

where:

RBC = Risk-based concentration (PCM f/cc)
TWF = time weighting factor to account for less than continuous exposure
$IUR_{a,d}$ = Inhalation unit risk for exposures that begin at age a and last for d years $(\text{PCM f/cc})^{-1}$

In order to be conservative, the following assumptions were used:

Target Risk = 1E-05
TWF = 2 days/fire, 5 fires/year = (240 hrs/yr) / (8760 hr/yr) = 0.027
a (age at first exposure) = 0 years
d (duration of residency in Libby) = 40 years
$IUR_{0,40}$ = 0.194 $(\text{PCM f/cc})^{-1}$(USEPA 2008)

Based on these conservative assumptions, the RBC equals about 0.002 PCM f/cc. Assuming that about 50% of all LA fibers are PCME, this corresponds to an RBC of about 0.004 LA f/cc. In order to ensure that the target sensitivity is adequate to ensure that samples with a true

concentration equal to the RBC can be accurately quantified, the target sensitivity is calculated as follows:

$$\text{Target sensitivity } (cc)^{-1} = \text{RBC (LA f/cc) / 5 LA fibers} = 0.0008\ (cc)^{-1}$$

Based on this, the target sensitivity is set to 0.0008 cc^{-1}. This ensures that an average of 5 LA fibers would be detected if air levels during a fire reached or exceeded the RBC.

4.0 SAMPLING PLAN

4.1 Sampling Station Locations

During a fire in OU3, air monitoring will be performed at three fixed stations and one mobile station, as follows:

Fixed Station 1: Based on meteorological data collected at the mine site, the predominant wind direction at OU3 is to the north-northeast (see Figure 2). This means that smoke and LA released from fires in OU3 is most likely to be transported in that direction. Under current conditions, most of the land north and east of the former mine is owned by the U.S. Forest Service or by logging companies, and human occupancy in this area is sparse. Based on this, during a fire event, one monitoring station will be established at a location in the downwind direction, west of Lake Koocanusa within the camping area at McGillivray Access.

Fixed Station 2: Because Libby is the location of the highest population density near the mine, a second air monitor will be established on the east side of the town of Libby to provide information on exposure levels to this population. The location of this monitor will be at the CDM offices.

Fixed Station 3: A third monitoring station will be established along Highway 37 at the U.S. Forest Service Canoe Gulch Ranger Station. This location was chosen based on its proximity to OU3 and the fact that people routinely occupy the station during work hours.

Mobile Station: In addition to these three stationary monitors at fixed locations, a fourth monitor will be deployed to an area downwind of the fire. The monitor will be transported to the collection site by truck. The sampling location and distance from the fire will depend on the conditions of the fire. Although details may vary, it is envisioned that the monitor will be placed on a tripod in the back of the truck. During sample collection, the coordinates of the monitor will be recorded. This information will be used later, in combination with data on the fire location, to establish the distance and direction of the monitor relative to the fire. The wind direction and speed at the sampling location should also be monitored.

4.2 Sample Collection Schedule

Air sampling at the three fixed monitoring stations will not occur except during times that a fire is burning in or near the FSRZ of OU3, and smoke from the fire is reaching the vicinity of one or more of the fixed monitors. [Note: This may include any controlled burns conducted by the USFS and the setting of "simulated wildfires" as part of EPA's Phase 4 Remedial Investigation, as may be appropriate.]

Notification that a fire is occurring in or near the FSRZ in OU3 will be provided to the field sampling team by the Forest Service as soon as possible after a fire is known to be occurring. If smoke is blowing toward Libby, the field crews will then activate all three monitors as soon as possible after notification. The person to be contacted in the event of a fire within the FSRZ is:

Mike Chapman
406-293-1983
chapman@montanasky.net

4.3 Sample Collection Protocol

All air samples will be collected in basic accord with SOP EPA-LIBBY-01 (Rev. 1, March 2001) (see Attachment 1). Each air sample will collected using a stationary air monitor.

Pumps may be either battery-powered or provided with 110 volt power from a reliable source. Air sampling cassettes will utilize a 25 mm diameter mixed cellulose ester (MCE) with a pore size of 0.8 um. Target pump rates will be 5 ± 0.5 L/min.

Each air sampling pump will be calibrated at the start of each sampling event using a rotameter that has been calibrated to a primary calibration source. Calibration will be considered complete when the measured flow is within ±10% of the target flow (5 L/min), as determined by the mean of three measurements.

For the three fixed air monitoring stations, each sample will be collected over a time period of about 24 hours. Sample collection will be repeated for 24-hour intervals as long as smoke from the fire continues to reach the community.

For the mobile air monitor, the sampling time depends on the level of smoke reaching the sampling station, as well as on the speed that the fire is moving. Assuming that there are no safety concerns, the sampling duration for the mobile monitor shall be about 30-60 minutes, depending on smoke level.

NOTE: In all cases, it is critical that mobile station sampling be performed in a way that does not endanger that health or safety of the sampling personnel. If conditions are considered to be potentially unsafe, the sampler should evacuate the area immediately.

4.4 Sample Documentation and Handling

Sample Documentation

Data regarding each sample collected as part of monitoring activities will be documented using a Libby OU3-specific field sample data sheet (FSDS) designed specifically for this plan (see Attachment 2). At the time of collection, each sample will be labeled with a unique 5-digit sequential identification (ID) number. The sample IDs for all samples collected as part of this monitoring plan will have a prefix of "SM" (e.g., SM-12345), unless specified otherwise. Information on whether the sample is representative of a field sample or a field-based QC sample (e.g., field blank) will be documented on the FSDS.

GPS coordinates for all sampling locations will be recorded on the FSDS form.

Each field sampling team will also maintain a field log book. The log book shall record all potentially relevant information on sampling activities and conditions that are not otherwise captured on the FSDS form. Examples of the type of information to be captured in the field log include:

- Names of team members
- Weather conditions
- Field sketches
- Physical description of the location relative to permanent landmarks
- Number and type of samples collected
- Any special circumstances that influenced sample collection
- Any deviations from sampling SOPs

Chain of Custody and Shipment

A chain-of-custody (COC) form specific to the Libby OU3 sampling shall accompany every shipment of samples to the analytical laboratory. The purposes of the COC form are: a) to establish the documentation necessary to trace possession from the time of collection to final disposal, and b) to identify the type of analysis requested.

OU3-specific COC forms can be obtained from the MWH Field Office in Libby, MT (an example of this form is provided in OU3 SOP No. 9 *Field Documentation* [see Attachment B of the main report]). Air volume for each sample should be calculated using the "Volume Calculator.xls" spreadsheet tool (provided as Attachment 3) and recorded on the COC form. All corrections to the COC form will be initialed and dated by the person making the corrections. Each COC form will include signatures of the appropriate individuals indicated on the form. The originals will accompany the samples to the laboratory and copies documenting each custody

change will be recorded and kept on file. One copy of the COC form will be kept by field personnel.

All required paper work, including sample container labels, COC forms, custody seals and shipping forms will be fully completed in indelible ink (or printed from a computer) prior to shipping of the samples to the laboratory. Shipping to the appropriate laboratory from the field will occur through overnight delivery.

All samples that may require special handling by laboratory personnel to prevent potential exposure to LA or other hazardous substances will be clearly labeled.

5.0 ANALYSIS REQUIREMENTS

All analytical laboratories that analyze samples of air for asbestos as part of this project must participate in and have satisfied the certification requirements in the last two proficiency examinations from the National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program (NVLAP).

All air samples collected during fires in OU3 will be analyzed using two methods.

5.1 PCM Analysis

All air samples from the three fixed-based monitors and the downwind mobile monitor will be analyzed initially by phase contrast microscopy (PCM) in basic accord with NIOSH Method 7400. It should be noted that PCM is not specific for LA or asbestos, and results from PCM analyses may not be a reliable indicator of actual LA levels in air. However, because analysis by PCM is rapid, this method can provide initial results much faster than TEM, and PCM results may be sufficient to provide a basis for initial risk management decision-making until more reliable data can be obtained.

Assuming that the typical sample volume for a fixed-based air sample will be about 7,200 L (24 hours x 60 min/h x 5 L/minute), and that 100 fields of view (each 0.00785 mm^2) are analyzed, this will achieve an analytical sensitivity of about 0.00007 cc^{-1}, which exceeds the DQO described above.

5.2 TEM Analysis

<u>Counting Rules</u>

Based on the results of PCM analysis, samples of air collected from stationary and mobile monitors may also be submitted for asbestos analysis using transmission electron microscopy (TEM) in basic accord with the International Organization for Standardization (ISO) 10312

method (ISO 1995) counting protocols, with all applicable Libby site-specific laboratory modifications, including the most recent versions of modifications LB-000016, LB-000019, LB-00028, LB-000030, LB-000066, and LB-000085 (see Attachment C of the main report). All structures that have Selective Area Electron Diffraction (SAED) patterns and Energy Dispersive X-Ray Analysis (EDXA) spectra that are consistent with LA, and have a length greater than or equal to 0.5 µm and an aspect ratio (length:width) ≥ 3:1, will be recorded on the Libby site-specific laboratory bench sheets and electronic data deliverable (EDD) spreadsheets. Data recording for chrysotile, if observed, is not required.

Stopping Rules

For field samples, evaluate each sample until one of the following is achieved:

- A minimum of 2 grid openings (GOs) in each of 2 grids has been examined.
- A target sensitivity of 0.0008 cc^{-1} is achieved. Assuming that the typical sample volume for a fixed-based sample will be about 7,200 L (24 hours x 60 min/h x 5 L/minute), that the sample may be analyzed with using a direct preparation, and that the area of a GO is 0.01 mm^2, it is expected that an analytical sensitivity of 0.0008 cc^{-1} can be achieved by counting about 8 GOs.
- 50 LA structures are observed
- An area of 0.5 mm^2 has been examined (approximately 50 GOs)

When one of these goals is achieved, complete the final GO and stop.

For lot blanks and field blanks, evaluate an area of 0.1 mm^2 (approximately 10 GOs) and stop.

5.3 Sample Archival and Final Disposition

All sample materials, including filters, grids, and cassettes will be maintained in storage at the laboratory unless otherwise directed by EPA. When authorized by EPA, the laboratory will be responsible for proper disposal of any remaining samples, sample containers, shipping containers, and packing materials in accordance with sound environmental practice, based on the sample analytical results.

5.4 Quality Control

Field-Based Quality Control Samples

Lot Blanks

Before any air cassettes may be used for asbestos sampling, the lot must be determined to be asbestos free. This will be accomplished by selecting 2 lot blanks at random from the group of

cassettes to be used for collection of air samples. Each lot blank will be submitted for TEM analysis as described above. Once the lot is confirmed to be asbestos free (i.e., both lot blanks are non-detect after evaluation of an area of 0.1 mm^2), that lot may be placed into use for sampling.

Field Blanks

A field blank for air shall be prepared by removing the sampling cassette from the box, opening the cassette to the air in the area where the investigative samples will be taken, then closing the cassette and packaging for shipment and analysis. Field blanks will be collected at a rate of 1 per 2 days that sampling is occurring.

Field Duplicate

A field duplicate air sample shall be collected at the downwind mobile monitoring station at the rate of 1 field duplicate per sampling event.

Laboratory-Based Quality Control Samples

The laboratory QC requirements for analyses of air samples at the Libby site are patterned after the requirements set forth by NVLAP. There are three types of laboratory-based QC analyses that are performed. Each of these is described below:

> *Lab Blank* - This is an analysis of a filter that is prepared from a new, unused filter in the laboratory and is analyzed using the same procedure as used for field blank samples.
>
> *Recount* - A recount is an analysis where TEM grid openings are re-examined after the initial examination. For PCM, a *Blind Recount* (RB) is a slide that has been analyzed is re-labeled and re-submitted (blind) for a second analysis within the same laboratory. For TEM, a *Recount Different* (RD) describes a re-examination by a different microscopist within the same laboratory than who performed the initial examination.
>
> *Repreparation* - A repreparation is an analysis of a TEM grid that is prepared from a new section of filter as was used to prepare the original grid(s). Typically, this is done within the same laboratory as did the original analysis, but a different laboratory may also prepare grids from a new piece of filter.

For this project, the frequency of each of these laboratory-based QC samples will be 1 per fire event (i.e., 1 lab blank, 1 recount, 1 repreparation per fire event). Samples for recount and repreparation will be selected by the analytical laboratory in accord with the selection procedures described in the most recent version of Libby laboratory modification #LB-000029.

6.0 DATA REPORTING REQUIREMENTS

6.1 Reporting of Sample Information

In the field, sample details and COC information will be documented on hard copy FSDS forms, field log books, and COC forms. Copies of all FSDS forms, field log books, and COC forms will be scanned and posted in portable document format (PDF) to a project-specific file transfer protocol (FTP) site at the end of each monitoring event. 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 documents will include the sample date in the format MMDDYY to facilitate document organization (e.g., "FSDS_083109.pdf").

A copy of the completed "Volume Calculator.xls" spreadsheet tool should also be posted to the FTP site at the end of each monitoring event. The file name for posted spreadsheets will include the date the file was posted to facilitate file tracking (e.g., "Volume Calculator_083109.xls").

6.2 Reporting of Analytical Results

All analytical results from air monitoring during fires will be provided to EPA for review and evaluation.

PCM results will be reported to EPA within 4 hours of sample receipt by the laboratory. The purpose of this rapid turn-around requirement is to allow EPA and the Forest Service to recognize if significant LA exposures are occurring in residential areas. The PCM data will be submitted to the EPA OU3 Project Manager electronically via email (lavelle.bonita@epa.gov). The email shall be copied to Remedium at the email address Robert.r.marriam@grace.com. TEM results will be reported within one week of sample receipt by the laboratory. All TEM results will be submitted using the most recent version of the TEM EDD for air samples in use at the Libby site.

All TEM EDDs and scanned copies of all hard copy lab reports will be submitted to EPA's technical contractor (SRC) electronically. Whenever possible, data files should be transmitted by e-mail to the following address:

LibbyOU3@srcinc.com

When files are too large to transmit by e-mail, they should be provided on compact disk to the following address:

Lynn Woodbury
SRC, Inc.
999 18th Street, Suite 1975
Denver CO 80202
(303) 357-3127

All original data records (both hard copy and electronic) will be cataloged and stored in their original form until otherwise directed by EPA.

6.3 Reports to Management

Field and analytical staff will promptly communicate any difficulties or problems in implementation of this to EPA, and may recommend changes as needed. All recommendations should be documented in a memo to the EPA RPM for OU3 at the following address:

Bonita Lavelle
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129
E-mail: lavelle.bonita@epa.gov

If any revisions to this plan are needed, the EPA RPM will approve these revisions before implementation by field or analytical staff.

7.0 REFERENCES

EPA. 2008. Phase II Sampling and Analysis Plan for Operable Unit 3 Libby Asbestos Site, Part C: Ecological Data. U.S. Environmental Protection Agency, Region 8. September 17, 2008.

EPA. 2009. Remedial Investigation for Operable Unit 3 Libby Asbestos Superfund Site Phase III Sampling and Analysis Plan. U.S. Environmental Protection Agency, Region 8. May 26, 2009.

FIGURES

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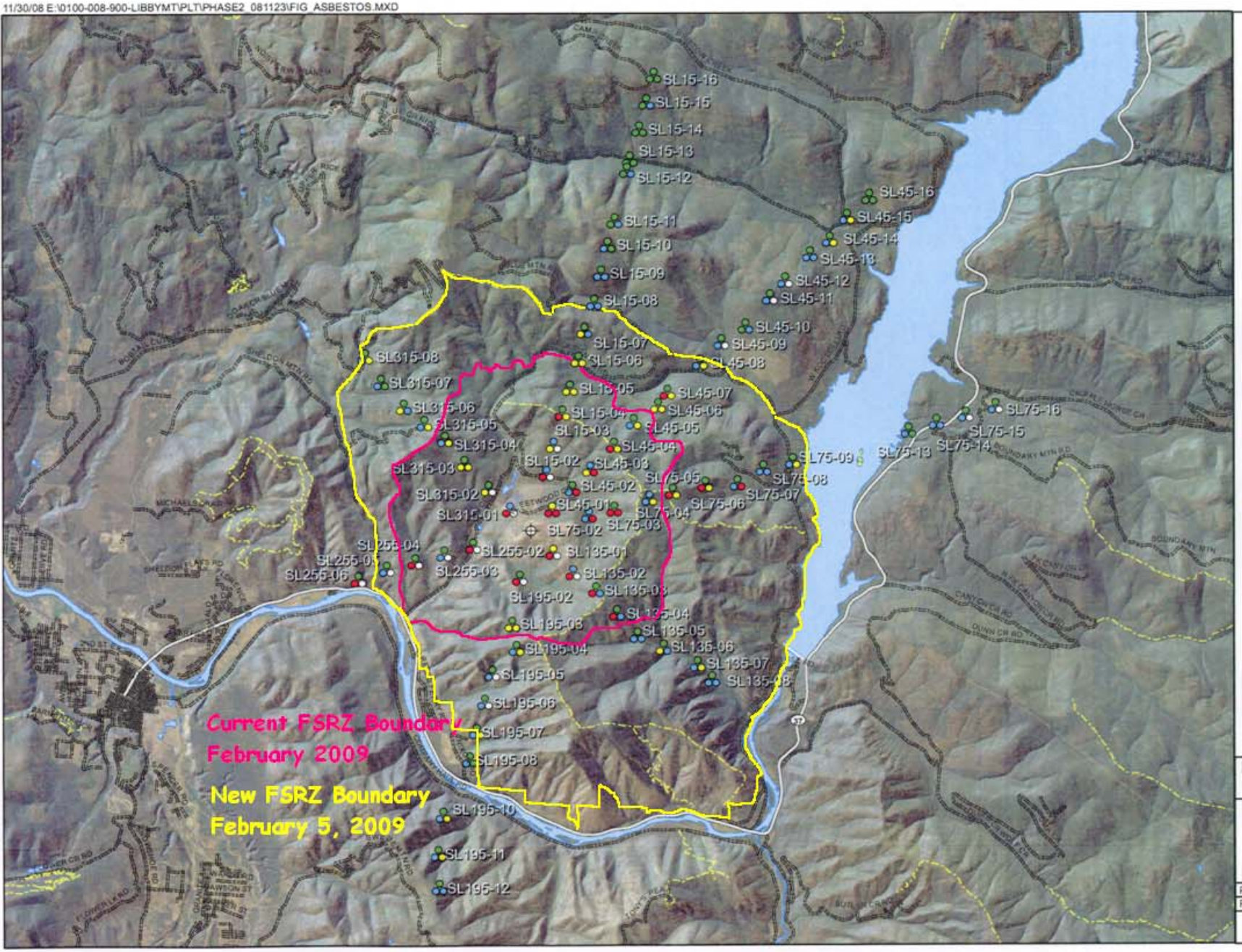
11/30/08 E:\0100-008-900-LIBBYMT\PLT\PHASE2_081123\FIG_ASBESTOS.MXD



Legend

Asbestos in Tree Bark (LA Loading)
- ND
- < 1.0 MS/cm2
- 1.0 - 2.5 MS/cm2
- > 2.5 MS/cm2

Asbestos in Forest Soil (MFLA% fine)
- ND
- TR
- < 1%
- 2 - 7%

Asbestos in Duff (MFLA% Dried)
- ND
- < 0.01%
- 0.01 - 0.5%
- > 0.5%
- No Data
- Origin of Transects
- County Road
- Primary Road
- National Forest Service Trails
- Open Water

Symbol Placement
Forest Soil
Tree Bark / Duff

N

0 1 2
Miles

LIBBY MONTANA SUPERFUND SITE
OPERABLE UNIT 3

Figure 1

PROJECT: 0100-008-900	NOV 30, 2008	
REV: 0	BY: VFS	CHK: ACK

NEWFIELDS

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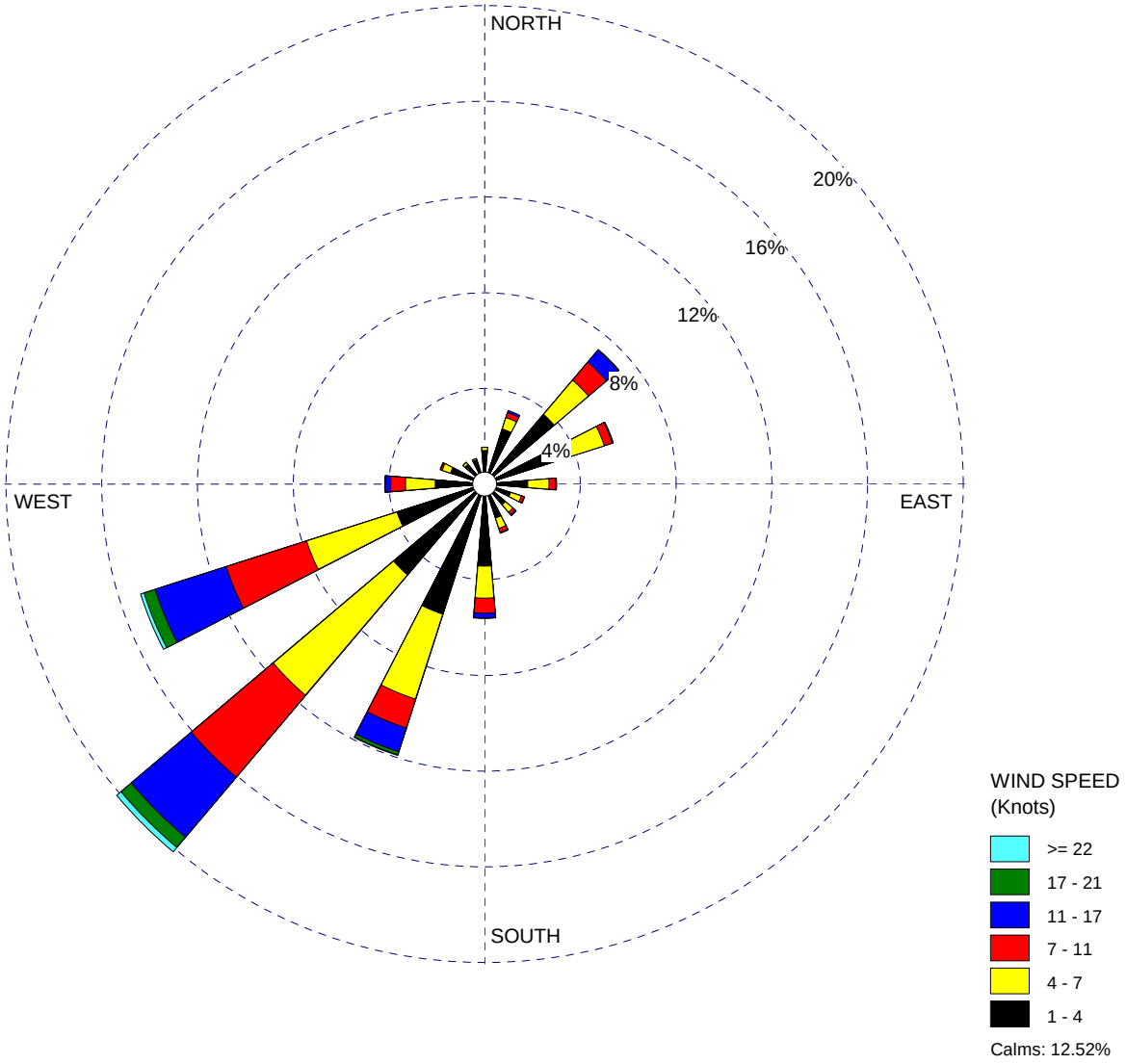
FIGURE 2
WindRose for Zonolite Mountain, Libby, MT

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2006-2009 **Jan 1 - Dec 31** **00:00 - 23:00**	**W.R. Grace**	
		MODELER: **MWH Global**	MWH BUILDING A BETTER WORLD
	CALM WINDS: **12.52%**	TOTAL COUNT: **26272 hrs.**	
	AVG. WIND SPEED: **4.93 Knots**	DATE: **2/26/2010**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

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ATTACHMENT 1

LIBBY-SPECIFIC
STANDARD OPERATING PROCEDURES (SOPs)

SOP EPA-LIBBY-01 (Revision 1, March 2001)

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 8

STANDARD OPERATING PROCEDURE (SOP) FOR THE SAMPLING OF ASBESTOS FIBERS IN AIR

Prepared by: for W. Brattin (Author) Date: 3/8/01

Reviewed by: (Project Director) Date: 3/8/01

(Quality Assurance Coordinator) Date: 3/8/01

Approved by: for Paul Peronard (Project Manager) Date: 3/9/01

REVISION LOG

Revision Date	Reason for Revision
02/28/01	--
03/07/01	Further define pump calibration procedures.

PROCEDURAL SECTION

1.0 Scope and Applicability

This Standard Operating Procedure (SOP) provides a standardized method for sampling air to measure the concentration of asbestos fibers. This SOP is applicable to any type of asbestos fiber (amphibole, chrysotile) that may exist in air (either indoor or outdoor), and is applicable to both personal and ambient air (referred as stationary air throughout this SOP) sampling techniques. Filters collected in this way are suitable for examination by a variety of microscopic techniques, including TEM, PCM, and SEM.

2.0 Summary of Method

This SOP is based on air sampling techniques described in EPA SOP 2015, ISO 10312, OSHA Technical Manual, NIOSH 7400 and NIOSH 7402.

Air is drawn through a fine-pore filter in order to trap any suspended particulate matter in the air, including suspended asbestos fibers and other mineralogic materials. The filters are then examined using an appropriate microscopic technique to observe, characterize and quantify the number of asbestos fibers on the filter. The concentration of fibers in air is then calculated by dividing the total number of fibers on the filter by the volume of air drawn through the filter.

3.0 Health and Safety Warnings

Asbestos fibers are hazardous to human health when inhaled. Exposure to excessive levels may increase the risk of lung cancer, mesothelioma, and asbestosis. All personnel engaged in collection of air samples in areas where asbestos fibers may be present must have adequate health and safety training and must wear an appropriate level of personal protective equipment (PPE). Refer to the Health and Safety Plan for further details.

4.0 Cautions

None, refer to Section 3.0.

5.0 Interferences

High levels of dust or other suspended particulates may clog or overload the filter and reduce the ability to observe and characterize asbestos fibers on the filters. Precautions should be taken to avoid any unnecessary sources of dust emissions or use of aerosol sprays. Sampling conditions

(flow rate, sampling time) should be adjusted accordingly to avoid filter overload.

6.0 Personnel Qualifications

Field personnel engaged in collection of filter cassettes must be trained in the proper use and calibration of the air sampling equipment (as specified in this SOP), as well as proper methods for data recording and sample handling. Additionally, all field personnel must maintain appropriate and current training and/or certifications to meet all federal, state, and local regulations.

7.0 Apparatus and Equipment

Filter Cassettes

All samples will be collected on conductive filter holders consisting of 25-mm diameter, three piece filter cassettes having a 50-mm long electrically conductive extension cowl. The cassette shall be pre-loaded with a mixed cellulose ester (MCE) filter with pore size 0.8 um. Use of the 0.8 um pore size is recommended for all samples so that samples collected using a high volume pump are comparable to samples collected with a low volume pump. The 0.8 um pore size filters are used for samples collected with a low volume pump in order to decrease back-pressure and increase flow rate.

To reduce contamination and to hold the cassette tightly together, seal the crease between the cassette base and the cowl with a shrink band or adhesive tape. If particle deposition on the inside of the cowl is observed, it may be necessary to ground the cowl to reduce static charge. This is done by attaching one end of a length of flexible wire to the plastic cowl with a hose clamp and attaching the other end of the wire to a suitable ground (e.g., a cold water pipe).

Air Pumps

The sampling pump used shall provide a non-fluctuating airflow through the filter and shall maintain the initial flow rate within ± 10% throughout the sampling period.

A variety of different types of air pump may be used, depending on the flow rates that are required to achieve the data quality objectives and desired analytical sensitivity of the project. In general, the pump should be selected to deliver a flow rate that is as high as possible without overloading the filter with dust or fibers. The minimum flow rate is 0.5 L/min, and rates up to 10 L/min may be appropriate in some cases.

For stationary air monitors, a high volume pump that operates on AC power is recommended. For personal air sampling, either a portable high volume AC powered sampler or a 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.

Tripod

For stationary air monitors, a tripod or other similar device is required to hold the filter cassette at a specified elevation above the floor. As noted below, this will typically be a height that represents the breathing zone (1.5-2 meters).

Spring Clips

For personal air monitors, the filter cassette is held in place using spring clips or other similar devices.

Rotameter

A rotameter that has been calibrated to a primary calibration source is required to calibrate the air flow rate at the start and the end of each sampling period. Due to its dependency on changes in atmospheric pressure, the rotameter must be calibrated to a primary calibration source at the site location (e.g., City of Libby) prior to sampling and re-calibrated on-site every week. Record calibration and re-calibration to the primary standard in the field logbook.

Primary Calibration Source

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

Sample Labels

A pre-printed sheet of sample labels (2 identical labels per sample number) is required. One label should be attached to the filter cassette before the sample collection period begins, and the matching label should be attached to the field data sheet that records relevant data on the sample being collected.

Field Log Book

A field log book is required to record relevant information regarding the collection of samples (location, time, unusual conditions or problems, etc.).

Field Data Sheet

A personal air or stationary air monitoring field data sheet (as appropriate) is required to record the relevant sampling information. Refer to the Phase 2 QAPP (EPA, March 2001) for the form.

8.0 Instrument Calibration

External calibration devices such as a bubble buret or a rotometer that have been calibrated to a primary calibration source may be used to calibrate air flow rate prior to air sampling. The flow rate must also be measured by the same method at the end of the sampling period.

8.1 Calibrating a Rotameter with an Electronic Calibrator (DryCal)

- See manufacturer's manual for operational instructions.
- To set up the calibration train, attach one end of the tygon tubing to the outlet plug of the rotameter; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the inlet plug of the rotameter to the outlet plug on the DryCal.
- Rest or firmly stabilize the rotameter so that it is vertical (± 6°).
- Attach an isolating load with a pressure drop of about 10 to 20 inches of water column in series with a stable pump (a filter cassette of same lot number as will be used for field samples works well for this).
- Turn the DryCal and sampling pump on.
- Turn the flow adjust screw (or knob) on the pump until the desired flow rate is attained.
- Record the DryCal flow rate reading and the corresponding rotameter reading in the field logbook. The rotameter should be able to work within the desired flow range.
- Perform the calibration three times until the desired flow rate of ± 5% is attained. Once at the sampling location, a secondary calibrator (e.g., rotameter) may be used to calibrate sampling pumps.

8.2 Calibrating an Air Pump with a Rotameter

A rotameter can be used provided it has been precalibrated to a primary calibration source at the site location (e.g., City of Libby). Three separate constant flow calibration readings should be obtained both before sampling and after sampling. The mean value of these flow rate measurements shall be used to calculate the total air volume sampled.

Turn on the sampling pump and run for 5 minutes before performing calibration.

- Remove the end plugs on the filter cassette. A cassette, representative of the lot planned for use in air sampling, must be used.
- To set up the calibration train, attach one end of the tygon tubing to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the rotameter.

- Rest or firmly stabilize the flow meter so that it is vertical (± 6°).
- Turn the flow adjust screw (or knob) on the sampling pump until the center of the float ball on the rotameter meets the flow rate value specified in the project plan.

9.0 Sample Collection

Apply one of the pre-printed adhesive labels to the filter cassette and apply the other to the field data sheet for the sample.

Secure the filter cassette in the appropriate sampling location. For a fixed air monitor, this will generally be at a height that represents the breathing zone of the potentially exposed population (e.g., 1.5- 2 meters above the floor). For personal air monitoring, the cassette will typically be placed on the lapel just below the face of the individual being monitored. For personal air sampling for Scenarios 2 and 3 [Refer to Phase 2 QAPP (EPA March 2001)] , secure the cassette on the lapel of the dominant hand of the worker. The distance from the nose/mouth of the person to the cassette should be about 10 cm. Secure the cassette on the collar or lapel using spring clips or other similar devices. In all cases, orient the cassette so the open face of the cowel is pointing downward to avoid any particles entering the filter by precipitation. Remove the protective cap over the open face of the cowel and turn on the calibrated pump. Record the starting time, the initial flow rate, and all other relevant sample data on the field data sheet for the sample. Store covers and end plugs in a clean area (e.g., a closed bag or box) during the sampling period.

For sampling events lasting longer than 2 hours, in-field pump checks should be performed approximately every 2 hours. These periodic checks should include the following activities:

- Observe the sampling apparatus (filter cassette, pump, tripod, etc.) to determine whether it's been disturbed.

- Check the pump to ensure it is working properly and the flow rate is stable at the prescribed flow rate.

- Inspect the filter for overloading and particle deposition. Inspect the filter using a small flashlight. Look for particle adhesion or deposition on the side of the cassette and check the filter surface for accumulation of visible dust or smoke particles. If particle deposition on the inside of the cowl is observed, it may be necessary to ground the cowl to reduce static charge.

After the specified sampling period has elapsed, measure the ending flow rate and ending clock time on the data sheet. Turn off the pump and remove the cassette from the pump. 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 without destroying the seal. Tape the ends of the seal together since the seal is not long enough to be wrapped end-to-end. Initial and date the seal.

10. Sample Handling and Preservation

Package the cassettes so they will not rattle during shipment nor be exposed to static electricity. Place custody seals, dated and marked with the packager's signature, onto the shipping container. Do not ship samples in polystyrene peanuts, vermiculite, paper shreds, or excelsior. Tape sample cassettes to sheet bubbles and place in a container that will cushion the samples in such a manner that they will not rattle. For additional shipping requirements, see the project plan.

Ship the sealed cassette to the analytical laboratory under proper chain of custody procedures. No preservation of the cassette is required.

QUALITY CONTROL and QUALITY ASSURANCE

Pre-Project Filter ("Lot") Blanks

Before samples are collected, two cassettes from each filter lot of 100 cassettes should be randomly selected and submitted for analysis. The lot blanks will be analyzed for asbestos fibers by the same method as will be used for field samples. The entire batch of cassettes should be rejected if any asbestos fiber is detected on any filter.

Field Blanks

Blank samples are used to determine if any contamination has occurred during sample handling. Prepare two blanks (from the sample lot used for field sampling) for the first 1 to 20 samples. For sets containing greater than 20 samples, prepare blanks as 10% of the samples. Filter blanks should be taken to a sampling location and prepared there. Remove the caps on the filter cassette and hold the cassette open for about 30 seconds. Close and seal the cassette as described in Section 9. Store blanks for shipment with the sample cassettes.

REFERENCES

NIOSH 7400

NIOSH 7402

ISO 10312

OSHA Technical Manual

EPA SOP 2015

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ATTACHMENT 2

LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS)
SMOKE MONITORING STATIONARY AIR MONITOR

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LIBBY OU3 FIELD SAMPLE DATA SHEET (FSDS)
SMOKE MONITORING STATIONARY AIR MONITOR

Station ID: _____ Field Logbook No: _____ Page No: _____

Station Comments: _____

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

X coord: _____ Y coord: _____ Elevation: _____m

Data Item	Cassette 1	Cassette 2	Cassette 3	Cassette 4
Index ID	*[affix label here]*	*[affix label here]*	*[affix label here]*	*[affix label here]*
Field QC Type (circle one)	FS-(field sample) FB-(field blank)	FS-(field sample) FB-(field blank)	FS-(field sample) FB-(field blank)	FS-(field sample) FB-(field blank)
Pump ID Number				
Flow Meter ID Number				
Start Date (mm/dd/yy)				
Start Time (hh:mm)				
Start Flow (L/min)				
Stop Date (mm/dd/yy)				
Stop Time (hh:mm)				
Stop Flow (L/min)				
Pump fault? (circle one)	Yes No	Yes No	Yes No	Yes No
Sample Air Volume (L)				
Field Comments Cassette Lot Number: _____				

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

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ATTACHMENT 3

VOLUME CALCULATOR SPREADSHEET TOOL

[provided electronically]

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