

Appendix J
Removal Quality Assurance Sampling Plan

Dynamac Corporation

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QUALITY ASSURANCE SAMPLING PLAN
FOR
PERIMETER AIR SAMPLING AND SOIL CONFIRMATION SAMPLING
AT
SOUTHWEST VERMICULITE Site – Emergency Response
ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO

Prepared For:

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1.0 INTRODUCTION

Dynamac Corporation (Dynamac) Superfund Technical Assessment and Response Team (START-3) has been tasked by the U.S. Environmental Protection Agency (EPA), Region 6, under Technical Direction Document (TDD) No. TO-0001-11-12-02, to conduct removal activities at three Haines Avenue Properties located north of the former Southwest Vermiculite (SWV) Site located in Albuquerque, Bernalillo County, New Mexico (NM) (Appendix A). The Southwest Vermiculite site is now occupied by the W Silver Recycling Company. Site Location, Aerial Location, and Facility Layout and Surrounding Properties maps are provided as Figures 1, 2, and 3, respectively. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database number for this site is NMN000607041. The focus of this investigation is to collect perimeter air samples and soil confirmation samples from the three properties located adjacent to north (on Haines Avenue) of the former Southwest Vermiculite site in order to determine the presence or absence of amphibole asbestos materials.

It is anticipated that SWV removal field activities will be performed between January 12, 2012 and February 11, 2012. This quality assurance sampling plan (QASP) is prepared in partial fulfillment of the TDD (Appendix A) requirements. This QASP is designed to guide field operations during the collection of samples and to describe the quality assurance/quality control (QA/QC) measures and procedures that will be implemented during field work.

START-3 is providing technical assistance to EPA Region 6 during the removal in the form of activity monitoring and field sampling activities. As part of this tasking, START-3 will collect soil confirmation samples and ambient air samples as part of the data collection activities associated with the EPA-lead removal activities.

The purpose of the collected analytical data is to determine: the efficiency of the soil excavation; if amphibole asbestos fibers are entering the ambient air as a result of the scheduled removal activities; and, the efficiency of the cleanup in the containment areas. The efficiency of the soil excavation will be determined with the collection and analysis of soil samples from the identified soil grids located in Area C. See Section 2.1 for description of designated areas. The potential community exposure to amphibole asbestos fibers in the ambient air will be determined with the collection and laboratory analysis of ambient air samples collected upwind and along the perimeter of the work area.

1.1 QASP Format

This QASP has been organized in a format that is intended to facilitate and effectively meet the objective of the removal assessment sampling activities. The QASP is organized as follows:

- Section 1 – Introduction
- Section 2 – Site Background
- Section 3 – Field Operations
- Section 4 – Sampling Design
- Section 5 – Analytical Methods
- Section 6 – Data Validation
- Section 7 – Quality Control/Quality Assurance
- Section 8 – Control of Contaminated Materials
- Section 9 – Reconciliation with Data Quality Objectives
- Section 10 – Deliverables and Project Organization
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2.0 SITE BACKGROUND

2.1 Site Location

The former SWV facility is located at 1800/1822 1st Street, NW in Albuquerque, Bernalillo County, New Mexico (NM). Geographic coordinates for the site are: 35.10251° N latitude and 106.64449° W longitude, as taken from the northwest entrance to the SWV facility (Figure 1). The SWV site is 1.5 acres in size and is bounded to the east by the Atchison, Topeka, Santa Fe (AT&SF) railroad tracks and right-of-way; bounded to the north by Haines Avenue and five (5) residential lots (two of which are occupied residential structures and are the subject properties for this Removal); bounded to the west by 1st Street, NW; and AT&SF railroad tracks to the south (Figures 2 and 3; Appendix B). The site is situated in an urban setting, with industrial, commercial, and residential properties located within a ¼ mile radius of the site (Figures 1 and 3).

The SWV site consists of three (3) buildings and an abandoned railroad spur (Figure 3). W Silver Recycling currently owns and operates a non-hazardous waste recycling facility at the site. All of the on-site buildings are being utilized by W Silver Recycling; however, several on-site buildings were used during operations conducted by SWV. The east,

south, and portions of the west side of the property are surrounded by a sheet metal fence topped with strands of barbed wire. This sheet metal fence limits accessibility and visibility of the site to the general public. The north side of the property is not fenced; the main office building acts as a barrier to the site.

For purposes of this EPA removal activity, the locations to be excavated and sampled are defined as the Haines Avenue Properties and have been divided into Areas and lot numbers (Figure 3). The following is a brief summary for each identified area:

- Area C, Lot 7 is an occupied residential structure/property located at 7 Haines Ave in Albuquerque, NM.
- Area C, Lot 8 is an unoccupied residential structure/property located at 11 Haines Ave in Albuquerque, NM.
- Area C, Lot 9 is a vacant lot located at 15 Haines Ave (northeast corner of Haines Ave and 1st Street) in Albuquerque, NM.

2.2 Site History

Pertinent information related to site history can be found in the *Quality Assurance Sampling Plan (QASP) for the Southwest Vermiculite Site*, submitted to EPA Response and Prevention Branch in June 2010.

3.0 FIELD OPERATIONS

3.1 CONCEPT OF OPERATIONS

3.1.1 Schedule

Field work is scheduled to commence January 12, 2012 and end approximately February 11, 2012. Preliminary laboratory results for the soil excavation samples are anticipated to be received by START-3 from the laboratory within one to three business days of sample submittal, and final results within 10 business days of sample submittal. Preliminary laboratory results (Phase Contract Microscopy [PCM]) for the ambient air samples are anticipated to be received by START-3 from the laboratory within three business days and final results within 10 business days. For those selected air samples to be analyzed by Transmission Electron Microscopy (TEM), the preliminary results are anticipated to be received within 10 business days of sample submittal and final results within 20 business days.

3.1.2 Health and Safety

START-3 will develop a site-specific Health and Safety Plan (HASP) for the perimeter air and soil confirmation sampling that will occur at the properties adjacent to the SWV site. Field activities will be conducted in accordance with START-3 Technical Standard Operating Procedures (TSOPs), the Generic QAPP, and the site-specific Health and Safety Plan (HASP).

3.1.3 Site Access and Logistics

Site access to the SWV site and surrounding properties will be obtained through the EPA On-Scene Coordinator (OSC), Mr. Mike McAteer. Removal activities will be coordinated with the EPA OSC, NMED, property owners, and the City of Albuquerque.

4.0 SAMPLING DESIGN

Confirmation soil samples will be collected from the excavated grid areas to determine the efficiency of the soil excavation activities. Under normal circumstances, an action level of 0.25% tremolite fibers by weight in the soil (established by EPA as the cleanup criterion) would be used and excavated grids that contain less than 0.25% by weight of tremolite fibers, would be backfilled with non-contaminated soil by the ERRS contractor. For those excavated grids in which the percentage fibers of tremolite by weight exceed 0.25%, additional soil excavation would normally occur. However, due to the nature of the sites/properties to be addressed under this QASP and Removal, and since a full two feet of soil will be excavated; no additional soil would be removed regardless of the results of the confirmation sampling.

The locations in which tremolite-contaminated soil will be excavated and soil confirmation samples collected and analyzed have been divided into three (3) distinct areas, which have been described in Section 2.1. The areas to be excavated and confirmation samples collected are as follows:

- Area C, Lot 7: Backyard grid AC7-001 to 2 ft;
- Area C, Lot 8: Backyard grid AC8-005 to 2 ft, east side yard/driveway grid AC8-007 to 2 ft, front yard grid AC8-008 to 2 ft; and, western side yard grid AC*-006 to 2 ft.
- Area C, Lot 9: Entire vacant lot grids AC9-009 and AC9-0010 to 2 ft.

4.1 Data Quality Objectives and Criteria for Measurement of Data

The objective of this sampling activity is to collect the data that most accurately determines the location and percent by weight of amphibole asbestos within the surface soils of the Haines Avenue Properties adjacent to the SWV site. To accomplish this, Data Quality Objectives (DQO) for determining the extent of site-related contamination in soil has been established and are included as Appendix D. The DQOs were developed using the seven-step process set out in EPA Guidance for Quality Assurance Project Plans: EPA QA/G-5.

4.2 Soil Sampling

Confirmation soil samples from Area C will be collected to determine the efficiency of the soil excavation and the vertical extent of tremolite fiber contamination.

Each collected confirmation soil sample will consist of a five-point composite sample, with the sample aliquots generally being collected from the center of the grid and the four corners of the grid. The sample aliquots will be collected with dedicated trowels to a depth of three (3) inches bgs. The five sample aliquots per grid will be transferred to a plastic bag and homogenized thoroughly before transferring the soil sample to the sample container. The soil samples will be collected according to EPA's ERT SOP No. 2012, Soil Sampling (Appendix B). All collected soil samples are to be prepared for analysis utilizing California Air Resources Board (CARB) 435, and analyzed by polarized light microscopy (PLM), for amphibole asbestos fibers by a fixed-based laboratory.

4.2.1 Soil Sample Locations

Area C, Lot 7: One (1) soil grid is expected to be excavated during the EPA-lead removal activities (Figures 4). One (1) five-point composite surface soil samples (one sample per grid) will be collected at a depth of 0 to 3 inches bgs after the tremolite-contaminated soil has been excavated and removed.

Area C, Lot 8: Four (4) soil grids are expected to be excavated during the EPA-lead removal activities (Figure 4). Four (5) five-point composite surface soil samples (one sample per grid) will be collected at a depth of 0 to 3 inches bgs after the tremolite-contaminated soil has been excavated and removed.

Area C, Lot 9: Two (2) soil grids are expected to be excavated during the EPA-lead removal activities (Figures 4). Two (2) five-point composite surface soil samples (one

sample per grid) will be collected at a depth of 0 to 3 inches bgs after the tremolite-contaminated soil has been excavated and removed.

The proposed number of confirmation soil samples to be collected is presented in Table 1, Confirmation Soil Sampling Summary (Estimated) and Table 2, QA/QC Analysis and Data Categories Summary – Soil. These tables identify number of samples to be collected; analytical parameters; type, volume, and number of containers needed; preservation requirements; and associated number and type of QC samples based on the data category.

During this event, additional soil samples may be collected from several areas not previously sampled during the removal assessment conducted in 2011. These areas may include the walkway along the western portion of 7 Haines, the rose garden along the northern property boundary at 7 Haines, and the Right of Ways/Easements in front of all three Haines Avenue Properties. START-3 will collect assessment soil samples for PLM analysis during the scheduled EPA-lead removal activities. Should PLM analysis of the collected soil samples indicate tremolite fibers exceeding 0.25% by weight in the soil samples, those grids will be excavated and START-3 will collect soil confirmation samples for PLM analysis.

4.3 Air Sampling

In order to determine if amphibole asbestos fibers are being released to the atmosphere during the removal activities, START-3 will collect ambient air samples for fiber and possible amphibole asbestos analysis. The collected stationary air samples will not be used to calculate potential risk to amphibole asbestos fibers, as this can only be performed through activity based sampling (ABS), but will serve to determine community exposure to amphibole asbestos fibers during the removal activities conducted by the ERRS contractor. Should the results of the removal activities indicate potential exposure to amphibole asbestos, concentrations greater than 0.01 f/cc, precautions will be made to reduce the amount of airborne amphibole asbestos particles from being released (aggressive dust suppression).

Fixed air sampling stations will be set up on a daily basis based on the day's predominant wind direction. An on-site meteorological station (shared with and located at the Solico

Removal Action to be conducted concurrently) will be utilized to determine the prevalent wind direction and other meteorological conditions. Upwind (background samples), crosswind, and downwind (perimeter) air samples will be collected from fixed air sampling locations. Ambient air samples will not be collected on days or inclement weather (e.g., rain; sleet, snow, or freezing rain) or during days when no scheduled removal activities are occurring.

The air samples will be collected according to the National Institute for Occupational Safety and Health (NIOSH) Method 7400 for Phase Contrast Microscopy (PCM) and the International Organization for Standardization (ISO) Method 10312 for Transmission Electron Microscopy (TEM), *Ambient Air – Determination of Asbestos Fibers: Direct Transfer Transmission Electron Microscopy Method (modified)*. NIOSH Method 7400 and ISO Method 10312 includes the following sampling procedures for correct sample collection: Each sampling pump is to be pre- and post-calibrated with the actual sampling filter or a representative 25mm cassette with a 0.8 µm pore size Mixed Cellulose Ester (MCE) filter in line. The filter cassette will employ a 50mm conductive cowl on cassette. Air samples will be collected approximately four (4) feet above the ground surface. The top cover from the cowl extension on the MCE sampling cassette will be removed (open-faced) and the MCE cassette oriented face down. The joint between the extender and the monitor body will be wrapped with tape or a band to ensure an adequate seal, to help hold the cassette together, and to provide a marking surface to identify the cassette. Secondly, all collected air samples, including blanks, will be shipped in an upright position, with the conductive cowl attached, and in a rigid container with packing material to prevent jostling or damage. Untreated polystyrene packaging material will not be used in the shipping container, as it tends to cause electrostatic forces that may cause fiber loss from the MCE sample filter.

To collect the air samples at medium volume (4 to 10 liters per minute [L/Min], high volume GAST air sampling pumps, with an attached sampling train, will be utilized. Portable generators and service extension cords will be utilized as a power supply for the GAST air sampling pumps. The sampling pumps will be calibrated on a daily basis using ERT SOP #2015, *Asbestos Sampling*, or according to the manufacturer's specifications (Appendix C). The air samples will be collected at a volume of 4 to 10 L/min for the period that encompasses the daily field activities (8 – 10 hours) in order to achieve a lower detection limit of 0.002 f/cc. All daily calibrations and sample volumes will be recorded on

field data sheets and entered into the site logbook. In addition, the air sampling devices will be inspected periodically each day to ensure proper operation and sample collection.

4.3.1 Upwind Air Sampling

Upwind air samples will be collected each day of field activities. The upwind air samples will be collected within the same general area as the soil sampling activities, upwind at a distance sufficient to prevent being influenced by site activities. Where practical, the areas selected for upwind air sampling should be free of known asbestos contamination. Final upwind sampling locations will be determined in the field based on accessibility, predominant wind direction, and other meteorological conditions. It is anticipated that the upwind air sampling will occur for the entire length of the work day (8 - 10 hours). All upwind air samples will be collected from the breathing zone, at approximately 4 feet above the ground surface. Upwind air samples will be collected concurrently with the crosswind and downwind, perimeter air sampling locations. Stationary sampling pumps and filter cassettes will be used to collect the upwind samples. The number of upwind samples collected per day will be dependent on the locations being excavated and weather conditions. At a minimum, one upwind air sample will be collected each day that crosswind and downwind air samples are collected. The total number of upwind air samples collected will be dependent on the number of day's field activities will occur and weather conditions allow for the collection of ambient air samples.

4.3.2 Perimeter Air Sampling

Crosswind and downwind (perimeter) air samples will be collected each day of field activities, at stationary locations in proximity to the soil sampling activities and other removal field activities. The fixed, perimeter air sampling locations will be collected crosswind and downwind of the removal activities and maybe located in off-site locations. The location of the fixed, perimeter air sampling locations will be dependent upon wind direction, accessibility, and other meteorological conditions. It is anticipated that the fixed, perimeter air sampling activities will occur for the entire length of the work day (8 - 10 hours). All fixed perimeter air samples will be collected from the breathing zone, approximately 4 feet above the ground surface. Fixed perimeter samples will be collected concurrently with the crosswind, and background air sampling locations. The number of daily perimeter air samples collected per day will be dependent on the locations being excavated and weather conditions. Two to four fixed, perimeter air

sampling stations per day may be used to determine if amphibole asbestos fibers are being released from the areas in which removal activities will be occurring. The total number of perimeter air samples will depend upon the number of fixed air sampling locations and the number of days required to conduct the field activities.

The upwind and perimeter air samples will be shipped to the laboratory for fiber determination utilizing PCM (NIOSH 7400) methodology. For those perimeter air samples that have fiber concentrations that exceed the Asbestos Hazardous Emergency Response Act (AHERA) permissible exposure limit (PEL) of 0.01 f/cc, the laboratory will be requested to re-analyze the air sample for asbestos concentration and fiber type determination utilizing TEM (ISO 10312).

4.4 Quality Control Sampling

Specific QC criteria have been developed to ensure that the Data Quality Objectives (DQOs) for identifying the presence of Libby amphibole asbestos fibers in soils and air are met. Analytical methods for sample analysis have been selected on the basis of the required detection limits, known contaminants existing in the study area, and the range of analytes to be determined. Table 1 presents method numbers and reference guidance, sample containers, sample volume requirements, sample preservatives, and holding times.

A field quality control (QC) program shall be implemented to ensure conformance with data quality protocols established by the EPA. The field QC program is generally comprised of additional collected field QC samples, including those samples described in the following sections.

4.4.1 Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and are treated in an identical manner during storage, transportation, and analysis. Duplicate samples will be collected at a minimum of 10% of the total number of samples.

Replicate or duplicate QC samples are submitted from the field to provide a means of determining the precision of the measurement process. The relative percent difference (RPD) for replicate analyses is defined as 100 times the absolute value of

the difference between replicates, divided by the mean of the replicates. To assess data representation, field-sampling procedures are observed to ensure that samples are collected in a consistent, standardized manner. In addition, the number of samples collected is monitored to ensure that an appropriate amount is collected to be representative of site conditions.

4.4.2 Lot Blanks

Lot blanks are samples of the filter collection media, from the same manufacturer's lot as those being used for sample collection, submitted to the laboratory for analysis to detect potential contamination or issues with the sampling media. A minimum of one lot blank will be submitted for each individual lot of asbestos air filter cassettes that are used for air sampling.

Per ISO 10312, the acceptable lot blank criteria will be less than 10 asbestos structures per square millimeter (mm^2) of filter area and the fiber count for asbestos fibers and bundles longer than $5\mu\text{m}$ shall be less than 0.1 fibers per mm^2 of the filter area.

4.4.3 Field Blanks

Field blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. At least two field blanks or 10% of the total samples, whichever is greater, shall be submitted each day air samples are collected. Top covers shall be removed from the field blank cassettes, stored in a clean area (e.g., closed bag or box) during sampling, and replaced onto the field blank cassettes when sampling is completed. The acceptance criteria for field blanks shall be based on twice the acceptance criteria for filter lot blanks or 20 structures/ mm^2 of filter area. Additionally, the field blank fiber count for asbestos fibers and bundles longer than $5\mu\text{m}$ shall be less than 0.1 fibers/ mm^2 of filter area. Field blank asbestos counts outside these criteria shall, at a minimum, be noted in the final report for the data.

4.4.4 Rinsate Blanks

Dedicated sampling equipment will be utilized during the course of the field activities, thus, no decontamination procedures will be conducted. Because dedicated

sampling equipment will be utilized rinsate blanks will not be collected as part of the sampling activities.

5.0 ANALYTICAL METHODS

All soil confirmation samples will be prepared for analysis by a procured, off-site laboratory using California Air Resources Board Method 435 (CARB 435), *Asbestos in Soil*. All collected soil confirmation samples will be analyzed for the presence of amphibole asbestos fibers by polarized light microscopy (PLM), utilizing SRC-Libby-03, Rev. 1, methodology. The procured laboratory maintains standards of all Libby amphibole asbestos types, which will be used in the identification of the Libby amphibole asbestos fibers. In addition, the procured laboratory has been certified to conduct the Libby amphibole asbestos fiber analyses using PLM (SRC-Libby-03).

The ambient perimeter air samples will be analyzed for fiber concentrations by PCM, utilizing NIOSH 7400 methodology. Should any ambient air sample have a fiber concentration exceeding the AHERA PEL of 0.01 f/cc, the laboratory will be requested to re-analyze the corresponding air sample to determine the actual asbestos concentration and identify the asbestos fiber type(s) by TEM, utilizing ISO 10312 methodology.

In summary, the analytical methods to be utilized during the removal sampling activities include the following:

- California Air Resources Board Method 435 (CARB 435), modified for soil (Polarized Light Microscopy);
- SRC-Libby-03 (Polarized Light Microscopy);
- ISO Method 10312, Ambient Air – Determination of Asbestos Fibers: Direct Transfer Transmission Electron Microscopy Method;
- NIOSH 7400 Method, Ambient Air (Phase Contrast Microscopy); and
- NIOSH 7402 Method, Ambient Air (Transmission Electron Microscopy).

The Detection Limits (DLs) for asbestos in soil using PLM (SRC-Libby-03) is 0.25%. The analytical sensitivity of the upwind and perimeter air sampling, utilizing PCM (NIOSH 7400), is 0.002 f/cc. For those upwind and perimeter air samples to be analyzed by TEM (ISO 10312), the analytical sensitivity of the upwind and perimeter air sampling for amphibole asbestos will be 0.002 f/cc. For those clearance air samples to be analyzed by TEM (NIOSH 7402) the analytical sensitivity will be 0.002 f/cc.

6.0 DATA VALIDATION

All data produced under this QASP will be evaluated to determine compliance with the stated collection methods, type, and number of samples collected, sample handling, and correct analytical procedures. Data review will be conducted in the laboratory prior to data release to evaluate the validity of the sample batch. Two data quality indicators, precision and accuracy, are used to assess the batch. Data verification are the steps taken to determine whether the quality requirements specified in the DQOs of this QASP have been met. Data verification will be performed by START-3. For field activities, it is necessary to determine whether the samples were collected using the sampling design specified in Subsections 4.1, 4.2, and 4.3, whether the samples were collected according to the method or SOP specified in Subsections 4.1, 4.2, or 4.3, whether the proper number and type of QC samples were taken to satisfy the QC requirements specified in Subsection 4.5, and whether the collected samples have been recorded and handled properly as in Subsections 7.3, 7.4, and 7.5.

For analytical activities, each sample should be verified to ensure that the procedures used to generate the data were performed as specified in the methods listed in Section 5. The proper frequency of preparation and analysis of QC check samples and the results of the QC check samples provide an indication of the quality of the data.

6.1 Verification and Validation Methods

Data verification occurs at each level in the field and in the laboratory to ensure that appropriate outputs are being generated routinely. Records produced electronically or maintained as hard copies are subject to data verification. During field activities, records associated with sample collection such as field data sheets, Chain of Custody (COC) records, shipper's air bills, logbook documentation, or electronic devices to log samples or print sample labels are verified against approved SOPs or procedures. At sample receipt, COC records are verified along with refrigerator and freezer logs to ensure the integrity of the samples. During sample preparation, digestion/extraction logs, certificates of analysis for surrogates and spiking compounds, refrigerator and freezer logs, analytical requests, and standard preparation logs are verified. Manufacturer's certificates for calibration and/or internal standards, instrument run or injection logs, standard preparation logs, calculation worksheets, and QC sample results are verified during the analysis of the sample set. Review of data package or client deliverables are verified for compliance with peer review procedures.

Ten percent of samples analyzed by TEM will be validated by comparing laboratory generated hand sheets with the laboratory generated NADES. In addition, START-3 will also verify sample volumes and chain of custody information. Data will be reviewed by START-3 personnel prior to release for completeness and to ensure that the QC specified in SRC-Libby-03, NIOSH 7400, NIOSH 7402, and ISO 10312 have been performed.

7.0 QUALITY CONTROL/QUALITY ASSURANCE

Definitive data is used for all data collection activities that require a high level of accuracy using EPA, National Institute of Safety and Health (NIOSH), American Society for Testing and Materials (ASTM), and other industry-recognized methods. For the data to be definitive, either total measurement error or analytical error must be determined. The following requirements for “Definitive Data” (DD) are applicable for the asbestos analyses using TEM and PLM:

1. Sample documentation in the form of field logbooks, the appropriate field data sheets and COC forms will be provided.
2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument logbook.
3. DLs will be determined and documented, along with the data, where appropriate.
4. Sample holding times will be documented; this includes documentation of sample collection and analysis dates.
5. Initial and continuing instrument calibration data will be provided.
6. Analyte identification will be confirmed on 100% of the samples by analytical methods associated with definitive data.
7. Quantitation results for all samples will be provided.
8. Analytical or total measurement error must be determined on 100% of the samples.
 - Analytical error determination measures the precision of the analytical method. At a minimum, two replicate aliquots are taken from a thoroughly homogenized sample or two media blanks, prepared and analyzed in accordance with the method, calculated and compared to method-specific performance criteria.
 - Total measurement error is determined from independently collected samples from the same location and analyzed by analytical methods associated with definitive data. Quality control parameters such as the mean, variance, and

coefficient of variation are calculated and compared to established measurement criteria.

Screening Data (SD) will be applicable to the “real-time” collection of data and has the requirements as follows:

1. Sample documentation in the form of field logbooks and appropriate field datasheets. Chain-of-custody (COC) records are optional for field screening locations.
2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument logbook. The manufacturer’s instructions or standard operating procedures (SOPs) should specify the procedure and frequency for calibration during use.
3. Detection Limit(s) will be determined and documented, along with the data, where appropriate.

7.1 Quality Assurance

The START-3 Project Team Leader (PTL) will be responsible for QA/QC of the field investigation activities. The designated laboratory utilized during the investigation will be responsible for QA/QC related to the analytical work. START-3 will also collect samples to verify that laboratory QA/QC is consistent with the required standards and to validate the laboratory data received.

7.2 Chain of Custody Procedures

All samples will be handled and preserved as described in EPA’s ERT SOP No. 2001 – General Field Sampling Guidelines (Appendix E). After the samples have been collected, the sampling data (station number, time collected, sampler, GPS coordinates, etc.) will be entered into the U.S. EPA’s SCRIBE Enterprise database. SCRIBE Enterprise will be used to generate sample labels and Chain-of-Custody (COC) forms for the collected samples to be shipped to a Dynamac-procured laboratory for chemical analysis. In addition, SCRIBE Enterprise will serve as the sampling database for all the samples collected during the SWV field removal activities.

A chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of samples and custody must be noted and signed for. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a locked container or placed in a container sealed with a custody seal.

The Chain-of-Custody record should include (at minimum) the following:

- Sample identification number.
- Sample information.
- Sample location.
- Sample date.
- Name(s) and signature(s) of sampler(s).
- Signature(s) of any individual(s) with control over samples.

7.3 Project Documentation

All documents will be completed legibly in ink. Field documentation may include entry into field logbooks, Response Manager, or SCRIBE. Response Manager is the Enterprise Data Collection System designed to provide near real-time access to data collected in the field.

7.4 Field Documentation

The following field documentation will be maintained as described below.

Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. Each individual will sign any entry he/she makes. Entries will include, at a minimum, the following:

- Site name and project number.
- Names of on-site personnel.
- Dates and times of all entries.
- Description of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain of custody information.
- Records of photographs.
- Site sketches.

- Calibration results

Photographic Documentation

START-3 team members will take photographs to document site conditions, sample locations and activities as work progresses. Initial conditions should be documented by photographing features that define the site-related contamination or special working conditions. Representative photographs should be taken of each type of site activity. The photographs should show typical operations and operating conditions as well as special situations and conditions that may arise during site activities. Site final conditions should also be documented as a record of how the site appeared at completion of the work.

All photographs will be taken with a digital camera. Each photograph will be recorded in the logbook and within Response Manager with the location of the photograph, direction the photograph was taken, the subject of the photograph, and its significance (i.e., why the picture was taken).

Sample Labels

Sample labels will be securely affixed to the sample container. The labels will clearly identify the particular sample and will include the following information:

- Site name and project number.
- Date and time the sample was collected.
- Sample preservation method.
- Analysis requested.
- Sampling location and identification.
- Name of person collecting the sample.

Chain-of-Custody Record

A chain of custody will be maintained from the time of sample collection until final deposition. When transferring the possession of samples, the individuals relinquishing and receiving should sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, or to the laboratory. Commercial carriers are not required to sign off on the Chain-of-Custody forms as long as the Chain-of-Custody forms are sealed inside the sample cooler and

the Custody Seals remain intact. The chain of custody is discussed in Subsection 7.2 Sample Custody Procedures.

Custody Seal

Custody seals demonstrate that a sample container has not been tampered with or opened. The individual who has custody of the samples will sign and date the seal and affix it to the container in such a manner that it cannot be opened without breaking the seal.

8.0 CONTROL OF CONTAMINATED MATERIALS

It is anticipated that the majority of the samples will be collected with dedicated sampling equipment; however, some non-dedicated sampling may be utilized during sample collection. The non-dedicated sampling equipment and sample containers will be decontaminated according to EPA's ERT SOP No. 2006 – Sample Decontamination (Appendix F). Any non-liquid investigation derived waste (IDW) generated through sampling operations will be double-bagged and disposed along with the excavated soils at the approved disposal facility. Any bulk generated liquid IDW will be mixed with the excavated soil and disposed of at the approved disposal facility.

9.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

The data will be assessed for accuracy, precision, completeness, representativeness, and comparability. Data assessment criteria are presented in the START-3 Generic QAPP, Section 4.0 "Assessment and Oversight" and Section 5.0, "Data Validation and Usability." Generally, data that do not meet the established acceptance criteria are cause for re-sampling and re-analysis. However, in some cases, data that do not meet acceptance criteria are usable with specified limitations. Data that are indicated as usable with limitations will be included in the final report, but will be clearly indicated as having limited usability. Indicators of data limitations include data qualifiers, quantitative evaluations, and narrative statements regarding potential bias.

10.0 DELIVERABLES AND PROJECT ORGANIZATION

At the completion of field activities and receipt of validated laboratory analytical data, a sampling activities report will be submitted to the EPA. The sampling activities report will document all pertinent sampling activities and the results of sample analyses.

The EPA OSC, Mike McAteer, will provide overall direction for this project and will identify sampling needs, determine the sampling schedule, and coordinate community relations.

The START-3 Project Manager (PjM), Steve Cowan is the primary contact with the EPA. The START-3 PjM is responsible for project team organization, supervision of all project tasks, monitoring, and documenting the quality of all work produced by the project team, determining deviations from the QASP, and assisting with the overall sampling effort. The Dynamac Laboratory QC Coordinator is the primary contact with the analytical laboratory. The analytical results of the samples collected during the removal will be verified by David Anderson, a chemist with Dynamac Corporation. To facilitate this process, Dynamac will request a Stage 2a Staged Electronic Data Deliverable (SEDD) and a Level IV data package from the procured laboratory.

11.0 BIBLIOGRAPHY

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Leonard Sullivan Oklahoma County Assessor Public Access System. Deed Records for 200 N. Wisconsin, Oklahoma City, Oklahoma. Accessed at <http://www.oklahomacounty.org/coclerk/deeds>. Accessed on August 9, 2009.

NIOSH. 2002. Pocket Guide to Chemical Hazards. U.S. Department of Health and Human Services, Washington, D.C. 2002.

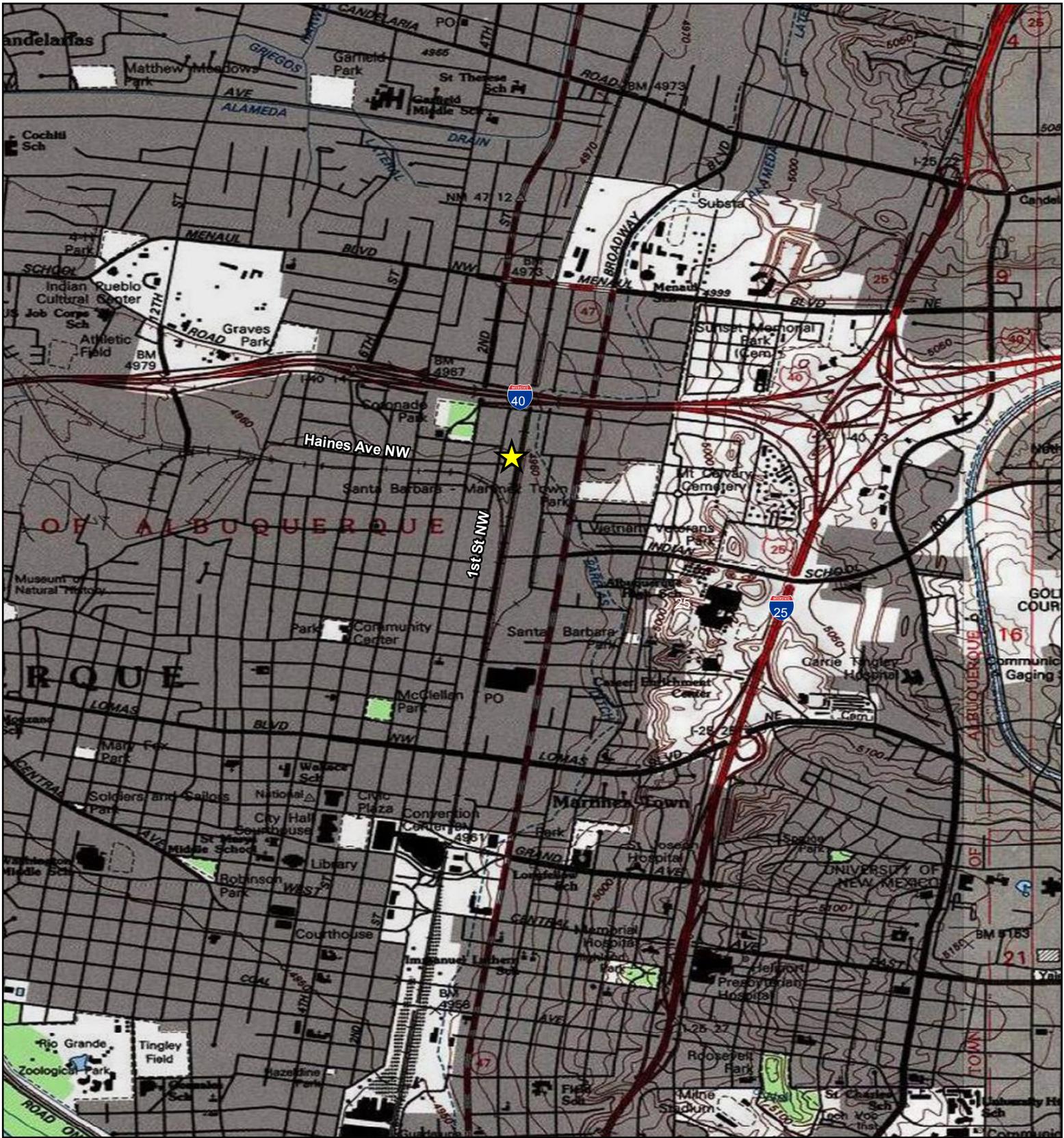
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OSWER Directive 9360.4-10. 1995. Superfund Program Representative Sampling Guidance Volume 1: Soil Interim Final. EPA 540/R-95/141 PB96-963207. December 1995.

USGS (U.S. Geological Society). 2005. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Natural Asbestos Occurrences in the Eastern United States. Open-File Report 2005-1189.

EPA SOP#: 2015 Asbestos Sampling. Date: 11/17/94, REV. #: 0.0 zz

FIGURES



Map of New Mexico



Legend

 Southwest Vermiculite-Haines Avenue Properties



1:24,000

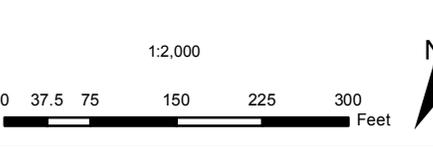
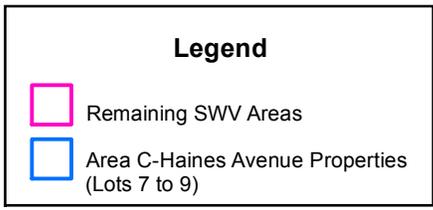
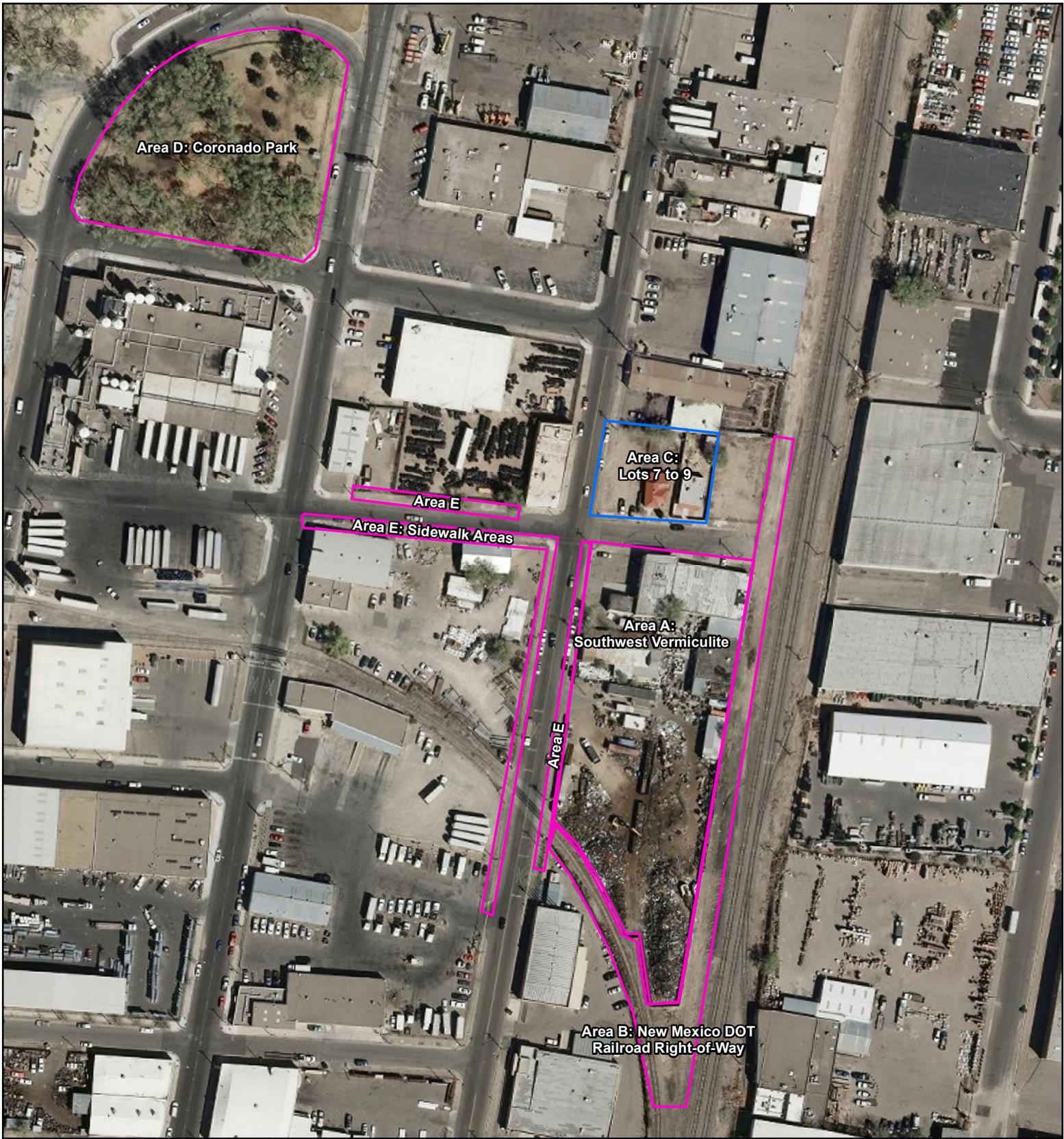


**US EPA Region 6
START-3**

Figure 1. Site Location Map
Southwest Vermiculite-Haines Avenue Properties
Albuquerque, Bernalillo County,
New Mexico 87102

SSID No. A6Q8
CERCLIS No. NMN000607041
TDD: TO-0001-11-12-02

Date: March 2012



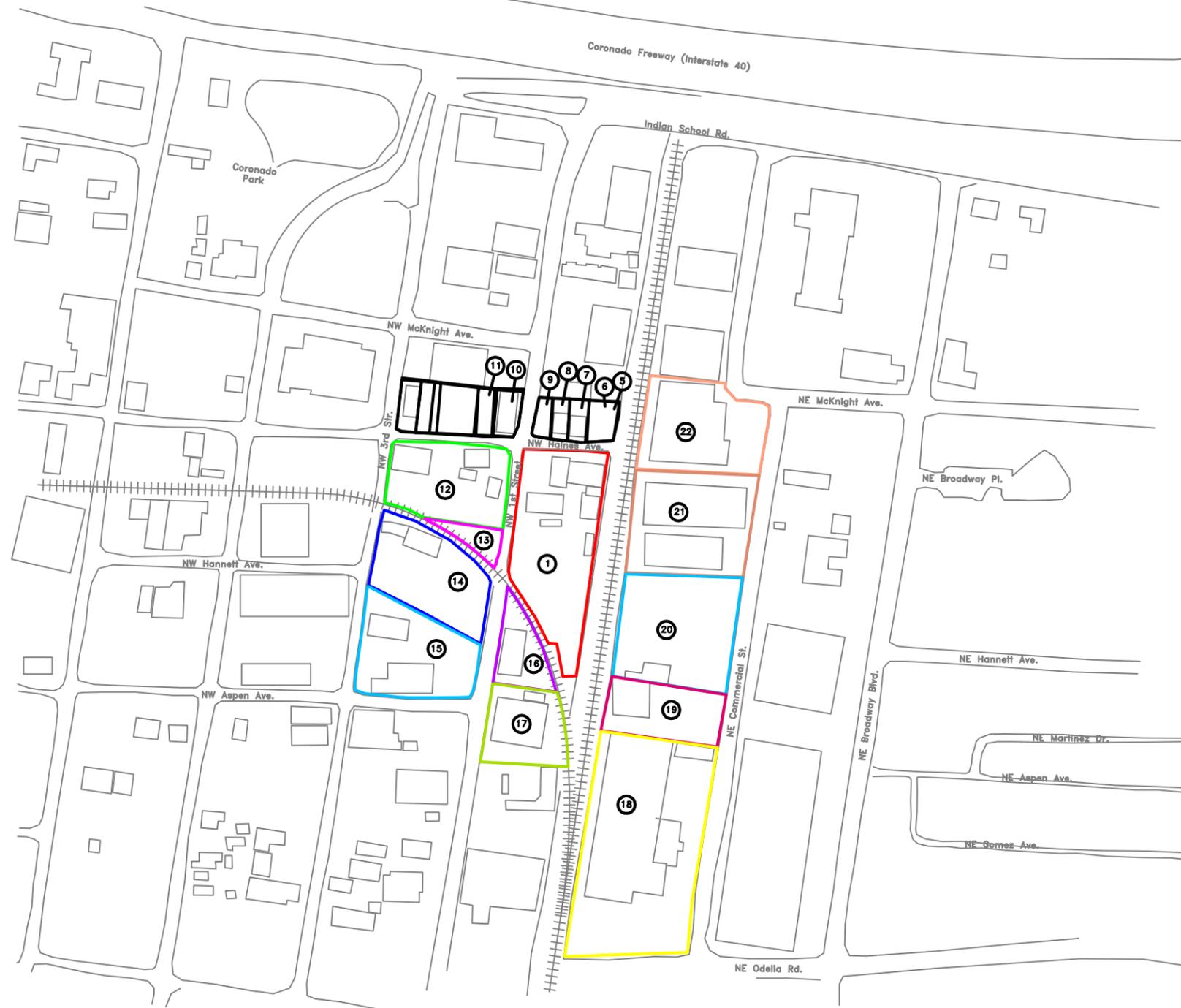


**US EPA Region 6
START-3**

**Figure 2. Aerial Location Map
Southwest Vermiculite and Haines Avenue Properties
Albuquerque, Bernalillo County,
New Mexico 87102**

SSID No. A6Q8
CERCLIS No. NMN000607041
TDD: TO-0001-11-12-02

Date: March 2012



Lot Number	Owner	Business Name
①	Jeannie Realty (W. Silver Recycling Co.)	
②	Leon/Amy Kennedy (Formerly Boys Appliances)	
③	Leon/Amy Kennedy (Formerly Boys Appliances)	
④	Jeannie Realty (Formerly Boys Appliances)	
⑤	Frank V, Elizabeth J & Sarah N (Unknown)	
⑥	Frank V, Elizabeth J & Sarah N (Unknown)	
⑦	Rafael Hernandez Diaz (Unknown)	
⑧	Steven A, & Agnes M Chankin (N/A)	
⑨	Cleofas Montano (N/A)	
⑩	X Noble Cerkleski (Unknown)	
⑪	Bridgestone/Firestone	
⑫	Ram Partnership (TP Pump)	
⑬	Ram Partnership (TP Pump)	
⑭	Creamland Dairies	
⑮	Creamland Dairies	
⑯	ATXSF Railway Co. (Unknown)	
⑰	EFS LLC (Unknown)	
⑱	Margaret B Matteucci Trust (Southern Wine & Spirits)	
⑲	Gerald V & Janise M Sypher (Builders Materials)	
⑳	Gerald V & Janise M Sypher (Proven Products)	
㉑	Timothy and Mary Sims (McClintock Paper)	
㉒	James R McClintock (McClintock Paper)	

CERCLIS No.
NMN000607042

TDD No.
TO-0002-09-09-02



US EPA REGION 6
START-3

LEGEND

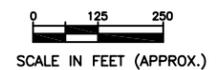
- ##### RAILROAD TRACKS
- AREA BOUNDARY LINE
- ① LOT NUMBER



FACILITY LAYOUT AND SURROUNDING
PROPERTY MAP

SOUTHWEST VERMICULITE
(CURRENTLY KNOWN AS W SILVER RECYCLING COMPANY)
Albuquerque, NM

Prepared for:	DYNAMAC
PROJECT MGR.:	SC
DRAWN BY:	SA
DATE:	1-25-10
PROJECT NO:	25338297





US EPA Region 6
START-3

Figure 4. Haines Avenue Properties,
Grid Locations, and Excavated Areas
Albuquerque, Bernalillo County,
New Mexico 87102

Legend

- Grids noted for excavation after Initial Assessment Sampling
- Grids added after additional Assessment Sampling



TABLES

TABLE 1: Confirmation Soil Sampling Summary (Estimated)

Matrix	Analytical Parameter	Depth	Container Type and Volume	Preservative	Holding Times	Subtotal Samples	Duplicate Samples (10%)	Field/Trip Blanks ¹	Rinsate Blanks ²	Lot Blanks ³	Total Field Samples ⁴
Soil	Asbestos (PLM)	0 to 3" inches bgs (Grids from Lots 7, 8 and 9)	1, Quart size sample bag	NA	NA	9	1	NA	NA	NA	10

LEGEND: PLM = Polarized Light Microscopy; bgs = below ground surface; oz = ounce; NA = Not Applicable

1. Field blanks are required for aqueous and non-aqueous matrices. Non-aqueous field blanks are prepared with clean sand or soil. For DD, one blank is required per day. One field blank or 10% of the total samples will be submitted each day as the samples are collected.
2. If dedicated sampling tools are not used, rinsate blanks are required for the aqueous matrix. Rinsate blanks are optional for the soil matrix.
3. A minimum of two lot blanks will be submitted for each different lot of asbestos air filter cassettes that are used.
4. Total field samples are obtained by adding the number of duplicate samples, field blanks, rinsate blanks, and Lot Blanks to the subtotal number of samples.

TABLE 2: QA/QC Analysis and Data Categories Summary – Soil Confirmation Sampling						
Matrix	Analytical Parameter	Analytical Method	Matrix Spikes		QA/QC	
			Lab	Additional	Detection Limits	Data Category
Soil	Asbestos (PLM)	CARB Method 435 Prep); SRC-Libby-03 (Analysis)	NA	NA	0.25%	DD

Notes: PLM = Polarized Light Microscopy; TEM = Transmission Electron Microscopy; ASTM = American Society for Testing Materials; CARB = California Air Resources Board; QA/QC = Quality Assurance/Quality Control; DD = Definitive Data; SD = Screening Data; NA = Not Applicable

TABLE 3: Removal Sampling Summary - Air					
Analytical Parameter	Sampling Media	Holding Times	Flow Rate	Volume Min - Max	Number of Samples
PCM (Fibers) NIOSH 7400 Ambient Air	0.8 µm 25 mm MCE Filter Cassette	Not Applicable	4 – 5 L/min	1,920 L to 3,000 L	±112
TEM Asbestos ISO 10312 Ambient Air	0.8 µm 25 mm MCE Filter Cassette	Not Applicable	4 – 5 L/min	1,920 L to 3,000 L	±12
TEM Asbestos ISO 10312 (Perimeter)	0.8 µm 25 mm MCE Filter Cassette	Not Applicable	10 L/min	6,000 L	TBD

Notes: TEM = Transmission Electron Microscopy; ISO = International Organization for Standardization; L/min = Liters per minute; L = Liters; Min. = minimum; max. = maximum; MCE = Mixed Cellulose Ester; TBD = To Be Determined in the field

TABLE 4: QA/QC Analysis and Data Categories Summary – Air

Analytical Parameter	Analytical Method	Estimated Limit of Detection	Lot Blanks	Field Blanks	Co-located Samples	Trip Blanks	Breakthrough	PE Samples	Data Category
PCM Fibers (Ambient Air, Containment, and Clearance)	NIOSH 7400	0.002 f/cc	1 per 50	TBD	N/A	N/A	N/A	N/A	DD
TEM Asbestos (Ambient Air)	ISO 10312	0.002 f/cc	1 per 50	TBD	N/A	N/A	N/A	N/A	DD

Notes: PE = Performance Evaluation; TEM = Transmission Electron Microscopy; ISO = International Organization for Standardization; f/cc = fibers per cubic centimeter; N/A = not applicable; DD = Definitive Data

APPENDIX A

Copy of TDD and Attachments

! = required field

Note: Remaining Amount includes \$0.00 in Reserve.

TDD Name: Southwest Vermiculite Site - Emergency Response	! Period: Base Period
! Purpose: Work Assignment Initiation, Incremental Funding	Verbal Date:
! Priority: High	! Start Date: 12/22/2011
Overtime: Yes	! Completion Date: 04/30/2012
! Funding Category: Removal	Invoice Unit:

! Project/Site Name: Southwest Vermiculite Site - Emergency Response	
Project Address: 7, 11, and 15 Haines Ave	Activity: Emergency Response
County: Bernalillo	Work Area Code:
City, State: Albuquerque, NM	Activity Code:
Zip: 87102	EMERGENCY CODE:
! SSID: A6Q8	FPN:
CERCLIS: NMN000607041	Performance Based: No
Operable Unit:	

Authorized TDD Ceiling:	Cost/Fee	LOE (Hours)
Previous Action(s):	\$0.00	0.0
This Action:	\$15,000.00	0.0
New Total:	\$15,000.00	0.0

Specific Elements

Description of Work:

All activities performed in support of this TDD shall be in accordance with the contract and TO PWS.

This is an emergency response at three residential lots adjacent to the Southwest Vermiculite Site. The properties are located at 7, 11, and 15 Haines Ave. in Albuquerque, NM Due to the presence of elevated levels of Libby Asbestos on these residential properties, EPA will conduct an emergency response to remove the contaminated soil down to at least one foot. START shall assist the OSC with a variety of tasks including the following:

START shall, if requested, conduct a site walk with task monitor and ERRS contractor at the SWV Emergency Response (Residential properties).

START shall coordinate all activities with the Task Monitor / OSC.

START shall provide a cost estimate to TM/OSC and Project Officer no later than 2 days after receipt of this TDD .

START shall photo document / document the conditions at the Site.

START shall maintain Site files.

START shall develop and implement a QA sampling plan as requested; determine and document the presence of hazardous materials and wastes. Sampling shall be representative of the materials at the Site.

START shall develop and implement a Health and Safety Plan.

START shall conduct perimeter air monitoring for contaminants of concern.

START shall conduct air sampling for contaminants of concern.

START shall perform confirmation sampling of soil for contaminants of concern.

START shall acquire laboratory services for analysis of air and soil samples.

START shall assist in the posting of the site information including status updates, photos, monitoring and sampling results on the EPAOSC.NET webpage.

START shall assist in the preparation of DRAFT Pollution Reports (PolReps).

START shall submit a daily Situation Report electronically to the OSC.

START shall execute QASP upon approval of Task Monitor.

START shall assist EPA with community relations activities, as requested, including assistance at at least one Public Availability Session.

SFO: 22

Line	DCN	IFMS	Budget / FY	Approp. Code	Budget Org Code	Program Element	Object Class	Site Project	Cost Org Code	Amount
1	RVC010	XXX	11	T	6A00E	302DC6C	2505	A6Q8RV00	C001	\$15,000.00

Funding Summary:	Funding
Previous:	\$0.00
This Action:	\$15,000.00
Total:	\$15,000.00

Funding Category
Removal

Section

PO Comments: Issued for OSC Mike McAteer due to POI issues.

Project Officer: Linda Carter

Date: 12/22/2011

Contracting Officer: Cora Stanley

Date: 12/28/2011

No **During the past three (3) calendar years has your company, or any of your employees that will be working at this site, previously performed work at this site/facility?**

Contractor Contact: Debra Pandak

Date: 01/03/2012

APPENDIX B

EPA ERT SOP No. 2012 – Soil Sampling



U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

SOP: 2012
PAGE: 1 of 13
REV: 0.0
DATE: 02/18/00

SOIL SAMPLING

CONTENTS

- 1.0 SCOPE AND APPLICATION
- 2.0 METHOD SUMMARY
- 3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE
- 4.0 POTENTIAL PROBLEMS
- 5.0 EQUIPMENT
- 6.0 REAGENTS
- 7.0 PROCEDURES
 - 7.1 Preparation
 - 7.2 Sample Collection
 - 7.2.1 Surface Soil Samples
 - 7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers
 - 7.2.3 Sampling at Depth with a Trier
 - 7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler
 - 7.2.5 Test Pit/Trench Excavation
- 8.0 CALCULATIONS
- 9.0 QUALITY ASSURANCE/QUALITY CONTROL
- 10.0 DATA VALIDATION
- 11.0 HEALTH AND SAFETY
- 12.0 REFERENCES
- 13.0 APPENDIX
 - Figures



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SOIL SAMPLING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe). Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in ERT/REAC SOP #2003 Rev. 0.0 08/11/94, *Sample Storage, Preservation and Handling*.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT



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SOIL SAMPLING

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
 - Tubes
 - Points
 - Drive head
 - Drop hammer
 - Puller jack and grip
- Backhoe



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SOIL SAMPLING

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT/REAC SOP #2006 Rev. 0.0 08/11/94, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample.

This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:



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SOIL SAMPLING

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.
3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.



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SOIL SAMPLING

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.
3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.
4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.
5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.
6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.
7. Remove the tube sampler, and unscrew the drill rods.
8. Remove the cutting tip and the core from the device.
9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.
10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.



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11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.
12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.
2. Rotate the trier once or twice to cut a core of material.
3. Slowly withdraw the trier, making sure that the slot is facing upward.
4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should



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be performed in accordance with ASTM D1586-98, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.
2. Place the sampler in a perpendicular position on the sample material.
3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.
4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.
5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.
6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.
2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.



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3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.
4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.
5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.
6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.
7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration



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activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan..

12.0 REFERENCES

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APPENDIX A
Figures
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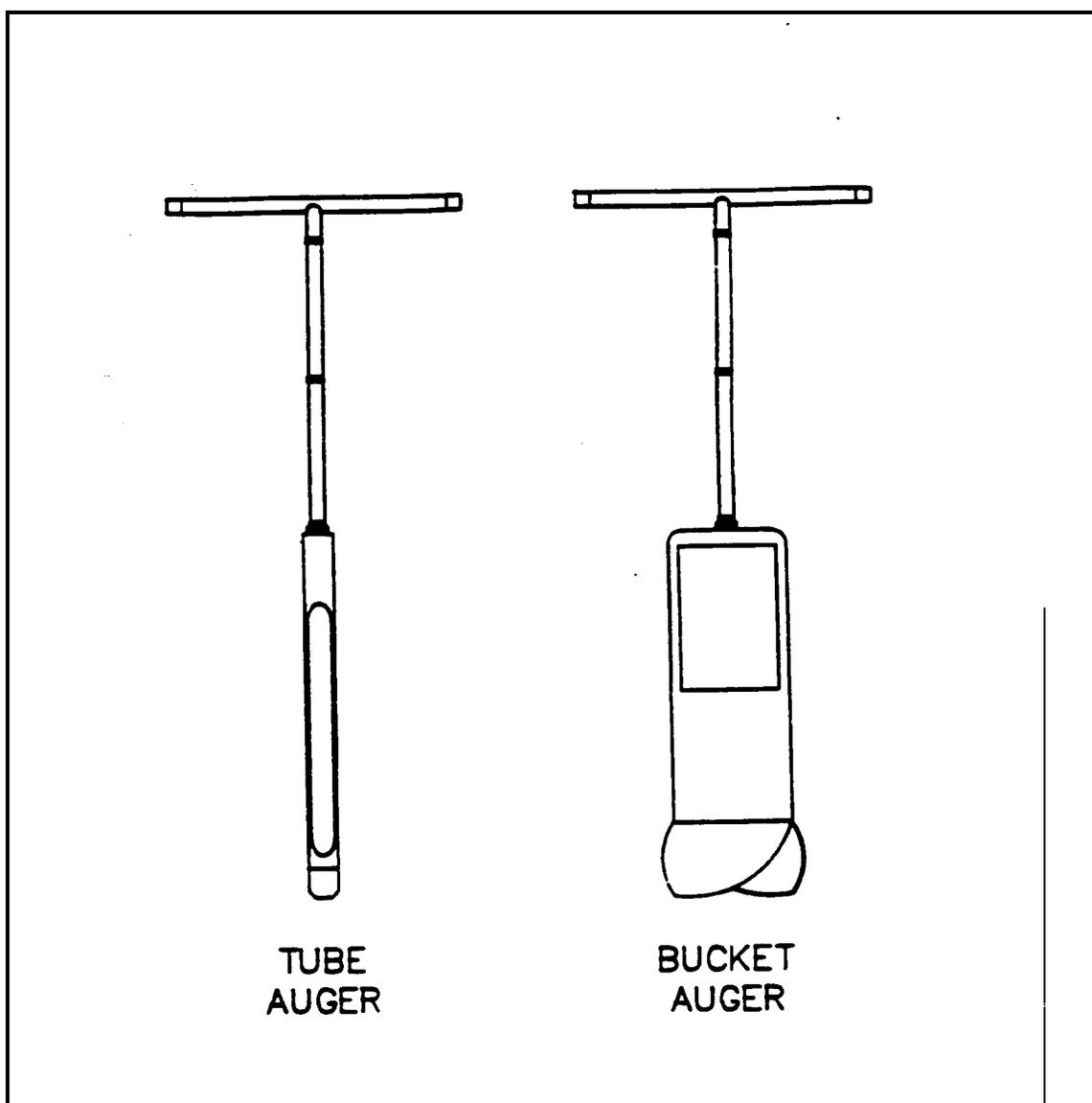
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FIGURE 1. Sampling Augers





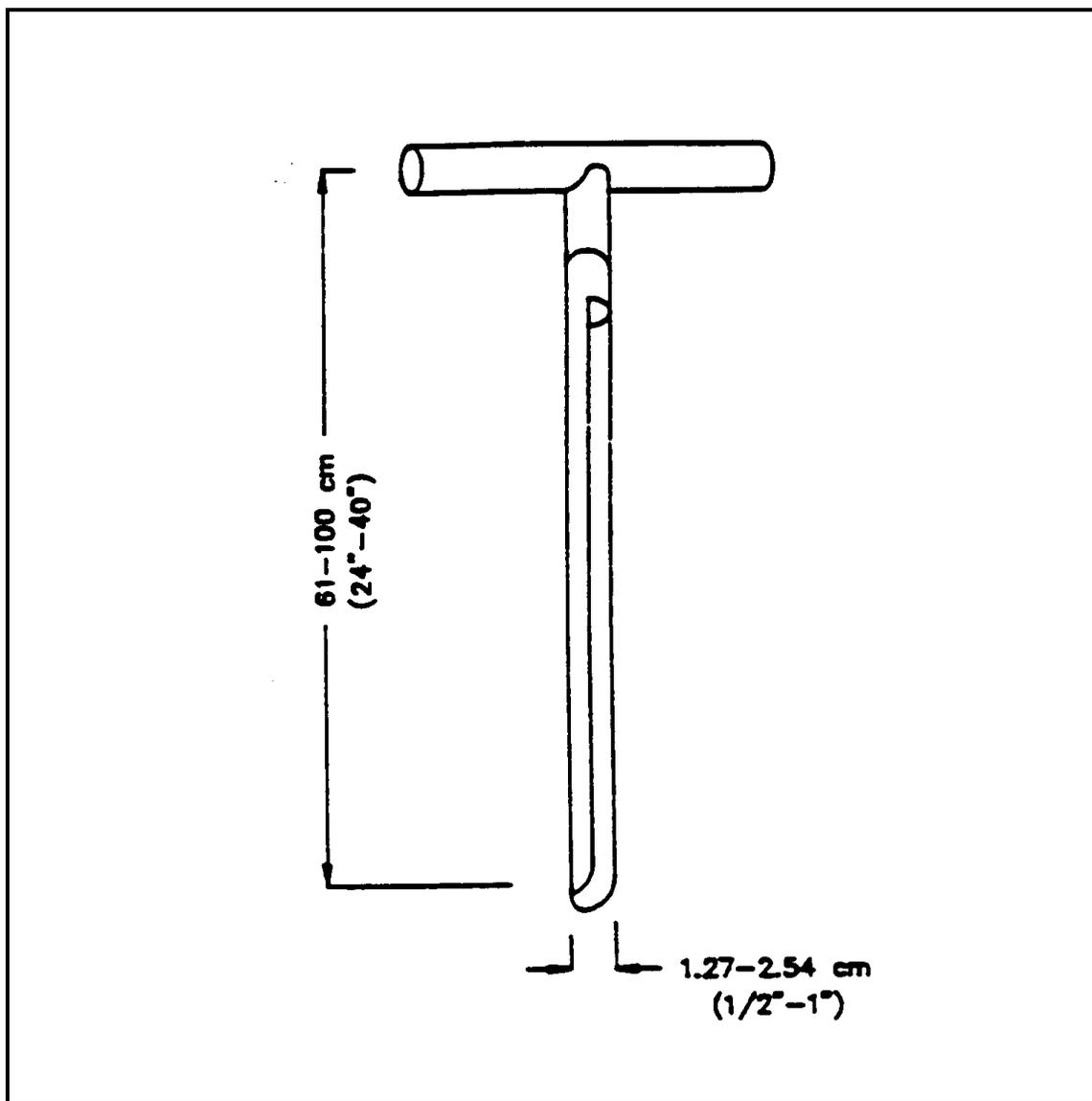
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FIGURE 2. Sampling Trier



APPENDIX C

EPA ERT SOP No. 2015 – Asbestos Air Sampling



ASBESTOS SAMPLING

SOP#: 2015
DATE: 11/17/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

Asbestos has been used in many commercial products including building materials such as flooring tiles and sheet goods, paints and coatings, insulation, and roofing asphalts. These products and others may be found at hazardous waste sites hanging on overhead pipes, contained in drums, abandoned in piles, or as part of a structure. Asbestos tailing piles from mining operations can also be a source of ambient asbestos fibers. Asbestos is a known carcinogen and requires air sampling to assess airborne exposure to human health. This Standard Operating Procedure (SOP) provides procedures for asbestos air sampling by drawing a known volume of air through a mixed cellulose ester (MCE) filter. The filter is then sent to a laboratory for analysis. The U.S. Environmental Protection Agency/Environmental Response Team (U.S. EPA/ERT) uses one of four analytical methods for determining asbestos in air. These include: U.S. EPA's Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air for Transmission Electron Microscopy (TEM)⁽¹⁾; U.S. EPA's Modified Yamate Method for TEM⁽²⁾; National Institute for Occupational Safety and Health (NIOSH) Method 7402 (direct method only) for TEM; and NIOSH Method 7400 for Phase Contrast Microscopy (PCM)⁽³⁾. Each method has specific sampling and analytical requirements (i.e., sample volume and flow rate) for determining asbestos in air.

The U.S. EPA/ERT typically follows procedures outlined in the TEM methods for determining mineralogical types of asbestos in air and for distinguishing asbestos from non-asbestos minerals. The Phase Contrast Microscopy (PCM) method is used by U.S. EPA/ERT as a screening tool since it is less costly than TEM. PCM cannot distinguish asbestos from non-asbestos fibers, therefore the TEM method may be necessary to confirm analytical results. For example, if an action level for the presence of fibers has been set and PCM analysis indicates that the action level has been exceeded, then

TEM analysis can be used to quantify and identify asbestos structures through examination of their morphology crystal structures (through electron diffraction), and elemental composition (through energy dispersive X-ray analysis). In this instance samples should be collected for both analyses in side by side sampling trains (some laboratories are able to perform PCM and TEM analysis from the same filter). The Superfund method is designed specifically to provide results suitable for supporting risk assessments at Superfund sites, it is applicable to a wide range of ambient air situations at hazardous waste sites. U.S. EPA's Modified Yamate Method for TEM is also used for ambient air sampling due to high volume requirements. The PCM and TEM NIOSH analytical methods require lower sample volumes and are typically used indoors; however, ERT will increase the volume requirement for outdoor application.

Other Regulations pertaining to asbestos have been promulgated by U.S. EPA and OSHA. U.S. EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulates asbestos-containing waste materials. NESHAP establishes management practices and standards for the handling of asbestos and emissions from waste disposal operations (40 CFR Part 61, Subparts A and M). U.S. EPA's 40 CFR 763 (July 1, 1987)⁽⁴⁾ and its addendum 40 CFR 763 (October 30, 1987)⁽⁴⁾ provide comprehensive rules for the asbestos abatement industry. State and local regulations on these issues vary and may be more stringent than federal requirements. The OSHA regulations in 29 CFR 1910.1001 and 29 CFR 1926.58 specify work practices and safety equipment such as respiratory protection and protective clothing when handling asbestos. The OSHA standard for an 8-hour, time-weighted average (TWA) is 0.2 fibers/cubic centimeters of air. This standard pertains to fibers with a length-to-width ratio of 3 to 1 with a fiber length $>5 \mu\text{m}$ ^(5,6). An action level of 0.1 fiber/cc (one-half the OSHA standard) is the level U.S. EPA has established in which employers must initiate such activities as air monitoring, employee training, and

medical surveillance^(5,6).

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Prior to sampling, the site should be characterized by identifying on-site as well as off-site sources of airborne asbestos. The array of sampling locations and the schedule for sample collection, is critical to the success of an investigation. Generally, sampling strategies to characterize a single point source are fairly straightforward, while multiple point sources and area sources increase the complexity of the sampling strategy. It is not within the scope of this SOP to provide a generic asbestos air sampling plan. Experience, objectives, and site characteristics will dictate the sampling strategy.

During a site investigation, sampling stations should be arranged to distinguish spatial trends in airborne asbestos concentrations. Sampling schedules should be fashioned to establish temporal trends. The sampling strategy typically requires that the concentration of asbestos at the source (worst case) or area of concern (downwind), crosswind, as well as background (upwind) contributions be quantified. See Table 1 (Appendix A) for U.S. EPA/ERT recommended sampling set up for ambient air. Indoor asbestos sampling requires a different type of strategy which is identified in Table 2 (Appendix A). It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks can be utilized to determine other sources.

Much information can be derived from each analytical method previously mentioned. Each analytical method has specific sampling requirements and produce results which may or may not be applicable to a specific sampling effort. The site sampling

objectives should be carefully identified so as to select the most appropriate analytical method. Additionally, some preparation (i.e., lot blanks results) prior to site sampling may be required, these requirements are specified in the analytical methods.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

3.1 Sample Preservation

No preservation is required for asbestos samples.

3.2 Sample Handling, Container and Storage Procedures

1. 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. The original cassette box is used to hold the samples.
2. Wrap the cassette individually in a plastic sample bag. Each bag should be marked indicating sample identification number, total volume, and date.
3. The wrapped sampling cassettes should be placed upright in a rigid container so that the cassette cap is on top and cassette base is on bottom. Use enough packing material to prevent jostling or damage. Do not use vermiculite as packing material for samples. If possible, hand carry to lab.
4. Provide appropriate documentation with samples (i.e., chain of custody and requested analytical methodology).

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Flow rates exceeding 16 liters/minute (L/min) which could result in filter destruction due to (a) failure of its physical support under force from the increased pressure drop; (b) leakage of air around the filter mount so that the filter is bypassed, or (c) damage to the asbestos structures due to increased impact velocities.

4.1 U.S. EPA's Superfund Method

4.1.1 Direct-transfer TEM Specimen Preparation Methods

Direct-Transfer TEM specimen preparation methods have the following significant interferences:

- C The achievable detection limit is restricted by the particulate density on the filter, which in turn is controlled by the sampled air volume and the total suspended particulate concentration in the atmosphere being sampled.
- C The precision of the result is dependent on the uniformity of the deposit of asbestos structures on the sample collection filter.
- C Air samples must be collected so that they have particulate and fiber loadings within narrow ranges. If too high a particulate loading occurs on the filter, it is not possible to prepare satisfactory TEM specimens by a direct-transfer method. If too high a fiber loading occurs on the filter, even if satisfactory TEM specimens can be prepared, accurate fiber counting will not be possible.

4.1.2 Indirect TEM Specimen Preparation Methods

Indirect TEM specimen preparation methods have the following interferences:

- C The size distribution of asbestos structures is modified.
- C There is increased opportunity for fiber loss or introduction of extraneous contamination.
- C When sample collection filters are ashed, any fiber contamination in the filter medium is concentrated on the TEM specimen grid.

It can be argued that direct methods yield an under-estimate of the asbestos structure concentration because many of the asbestos fibers present are concealed by other particulate material with which they are associated. Conversely, indirect methods can be considered to yield an over-estimate because some types of complex asbestos structures disintegrate

during the preparation, resulting in an increase in the numbers of structures counted.

4.2 U.S. EPA's Modified Yamate Method for TEM

High concentrations of background dust interfere with fiber identification.

4.3 NIOSH Method for TEM

Other amphibole particles that have aspect ratios greater than 3:1 and elemental compositions similar to the asbestos minerals may interfere in the TEM analysis. Some non-amphibole minerals may give electron diffraction patterns similar to amphiboles. High concentrations of background dust interfere with fiber identification.

4.4 NIOSH Method for PCM

PCM cannot distinguish asbestos from non-asbestos fibers; therefore, all particles meeting the counting criteria are counted as total asbestos fibers. Fiber less than 0.25 μm in length will not be detected by this method. High levels of non-fibrous dust particles may obscure fibers in the field of view and increase the detection limit.

5.0 EQUIPMENT/MATERIALS

5.1 Sampling Pump

The constant flow or critical orifice controlled sampling pump should be capable of a flow-rate and pumping time sufficient to achieve the desired volume of air sampled.

The lower flow personal sampling pumps generally provide a flow rate of 20 cubic centimeters/minute (cc/min) to 4 L/min. These pumps are usually battery powered. High flow pumps are utilized when flow rates between 2 L/min to 20 L/min are required. High flow pumps are used for short sampling periods so as to obtain the desired sample volume. High flow pumps usually run on AC power and can be plugged into a nearby outlet. If an outlet is not available then a generator should be obtained. The generator should be positioned downwind from the sampling pump. Additional voltage may be required if more than one pump is plugged into the same generator. Several

electrical extension cords may be required if sampling locations are remote.

The recommended volume for the Superfund method (Phase I) requires approximately 20 hours to collect. Such pumps typically draw 6 amps at full power so that 2 lead/acid batteries should provide sufficient power to collect a full sample. The use of line voltage, where available, eliminates the difficulties associated with transporting stored electrical energy.

A stand should be used to hold the filter cassette at the desired height for sampling and the filter cassette shall be isolated from the vibrations of the pump.

5.2 Filter Cassette

The cassettes are purchased with the required filters in position, or can be assembled in a laminar flow hood or clean area. When the filters are in position, a shrink cellulose band or adhesive tape should be applied to cassette joints to prevent air leakage.

5.2.1 TEM Cassette Requirements

Commercially available field monitors, comprising 25 mm diameter three-piece cassettes, with conductive extension cowls shall be used for sample collection. The cassette must be new and not previously used. The cassette shall be loaded with an MCE filter of pore size 0.45 μm , and supplied from a lot number which has been qualified as low background for asbestos determination. The cowls should be constructed of electrically conducting material to minimize electrostatic effects. The filter shall be backed by a 5 μm pore size MCE filter (Figure 1, Appendix B).

5.2.2 PCM Cassette Requirements

NIOSH Method 7400, PCM involves using a 0.8 to 1.2 μm mixed cellulose ester membrane, 25 mm diameter, 50 mm conductive cowl on cassette (Figure 2, Appendix B). Some labs are able to perform PCM and TEM analysis on the same filter; however, this should be discussed with the laboratory prior to sampling.

5.3 Other Equipment

- C Inert tubing with glass cyclone and hose barb
- C Whirlbags (plastic bags) for cassettes

- C Tools - small screw drivers
- C Container - to keep samples upright
- C Generator or electrical outlet (may not be required)
- C Extension cords (may not be required)
- C Multiple plug outlet
- C Sample labels
- C Air data sheets
- C Chain of Custody records

6.0 REAGENTS

Reagents are not required for the preservation of asbestos samples.

7.0 PROCEDURES

7.1 Air Volumes and Flow Rates

Sampling volumes are determined on the basis of how many fibers need to be collected for reliable measurements. Therefore, one must estimate how many airborne fibers may be in the sampling location.

Since the concentration of airborne aerosol contaminants will have some effect on the sample, the following is a suggested criteria to assist in selecting a flow rate based on real-time aerosol monitor (RAM) readings in milligrams/cubic meter (mg/m^3).

	<u>Concentration</u>	<u>Flow Rate</u>
C Low RAM readings:	<6.0 mg/m^3	11-15. L/min
C Medium RAM readings:	>6.0 mg/m^3	7.5 L/min
C High RAM readings:	>10. mg/m^3	2.5 L/min

In practice, pumps that are available for environmental sampling at remote locations operate under a maximum load of approximately 12 L/min.

7.1.1 U.S. EPA's Superfund Method

The Superfund Method incorporates an indirect preparation procedure to provide flexibility in the amount of deposit that be can be tolerated on the sample filter and to allow for the selective concentration of asbestos prior to analysis. To minimize contributions to background contamination from asbestos present in the plastic matrices of membrane filters while allowing for sufficient quantities of asbestos to be collected, this method also requires the collection of a larger volume of air per unit area of filter than has traditionally been collected

for asbestos analysis. Due to the need to collect large volumes of air, higher sampling flow rates are recommended in this method than have generally been employed for asbestos sampling in the past. As an alternative, samples may be collected over longer time intervals. However, this restricts the flexibility required to allow samples to be collected while uniform meteorological conditions prevail.

The sampling rate and the period of sampling should be selected to yield as high a sampled volume as possible, which will minimize the influence of filter contamination. Wherever possible, a volume of 15 cubic meters (15,000 L) shall be sampled for those samples intended for analysis only by the indirect TEM preparation method (Phase 1 samples). For those samples to be prepared by both the indirect and the direct specimen preparation methods (Phase 2 samples), the volumes must be adjusted so as to provide a suitably-loaded filter for the direct TEM preparation method. One option is to collect filters at several loadings to bracket the estimated optimum loading for a particular site. Such filters can be screened in the laboratory so that only those filters closest to optimal loading are analyzed. It has been found that the volume cannot normally exceed 5 cubic meters (5000 L) in an urban or agricultural area, and 10 cubic meters (10,000 L) in a rural area for samples collected on a 25 mm filter and prepared by a direct-transfer technique.

An upper limit to the range of acceptable flow rates for this method is 15 L/min. At many locations, wind patterns exhibit strong diurnal variations. Therefore, intermittent sampling (sampling over a fixed time interval repeated over several days) may be necessary to accumulate 20 hours of sampling time over constant wind conditions. Other sampling objectives also may necessitate intermittent sampling. The objective is to design a sampling schedule so that samples are collected under uniform conditions throughout the sampling interval. This method provides for such options. Air volumes collected on Phase I samples are maximized (<16 L/min). Air volumes collected on Phase 2 samples are limited to provide optimum loading for filters to be prepared by a direct-transfer procedure.

7.1.2 U.S. EPA's Modified Yamate Method for TEM

U.S. EPA's TEM method requires a minimum volume

of 560 L and a maximum volume of 3,800 L in order to obtain an analytical sensitivity of 0.005 structures/cc. The optimal volume for TEM is 1200 L to 1800 L. These volumes are determined using a 200 mesh EM grid opening with a 25-mm filter cassette. Changes in volume would be necessary if a 37-mm filter cassette is used since the effective area of a 25 mm (385 sq mm) and 37 mm (855 sq m) differ.

7.1.3 NIOSH Method for TEM and PCM

The minimum recommended volume for TEM and PCM is 400 L at 0.1 fiber/cc. Sampling time is adjusted to obtain optimum fiber loading on the filter. A sampling rate of 1 to 4 L/min for eight hours (700 to 2800 L) is appropriate in non-dusty atmospheres containing 0.1 fiber/cc. Dusty atmospheres i.e., areas with high levels of asbestos, require smaller sample volumes (<400 L) to obtain countable samples.

In such cases, take short, consecutive samples and average the results over the total collection time. For documenting episodic exposures, use high flow rates (7 to 16 L/min) over shorter sampling times. In relatively clean atmospheres where targeted fiber concentrations are much less than 0.1 fiber/cc, use larger sample volumes (3,000 to 10,000 L) to achieve quantifiable loadings. Take care, however, not to overload the filter with background dust. If > 50% of the filter surface is covered with particles, the filter may be too overloaded to count and will bias the measured fiber concentration. Do not exceed 0.5 mg total dust loading on the filter.

7.2 Calibration Procedures

In order to determine if a sampling pump is measuring the flow rate or volume of air correctly, it is necessary to calibrate the instrument. Sampling pumps should be calibrated immediately before and after each use. Preliminary calibration should be conducted using a primary calibrator such as a soap bubble type calibrator, (e.g., a Buck Calibrator, Gilibrator, or equivalent primary calibrator) with a representative filter cassette installed between the pump and the calibrator. The representative sampling cassette can be reused for calibrating other pumps that will be used for asbestos sampling. The same cassette lot used for sampling should also be used for the calibration. A sticker should be affixed to the outside of the extension cowl marked "Calibration Cassette."

A rotameter can be used provided it has been recently precalibrated with a primary calibrator. Three separate constant flow calibration readings should be obtained both before sampling and after sampling. Should the flow rate change by more than 5% during the sampling period, the average of the pre- and post-calibration rates will be used to calculate the total sample volume. The sampling pump used shall provide a non-fluctuating air-flow through the filter, and shall maintain the initial volume flow-rate to within $\pm 10\%$ throughout the sampling period. The mean value of these flow-rate measurements shall be used to calculate the total air volume sampled. A constant flow or critical orifice controlled pump meets these requirements. If at any time the measurement indicates that the flow-rate has decreased by more than 30%, the sampling shall be terminated. Flexible tubing is used to connect the filter cassette to the sampling pump. Sampling pumps can be calibrated prior to coming on-site so that time is saved when performing on-site calibration.

7.2.1 Calibrating a Personal Sampling Pump with an Electronic Calibrator

1. See Manufacturer's manual for operational instructions.
2. Set up the calibration train as shown in (Figure 3, Appendix B) using a sampling pump, electronic calibrator, and a representative filter cassette. The same lot sampling cassette used for sampling should also be used for calibrating.
3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 foot) 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 electronic calibrator.
4. Turn the electronic calibrator and sampling pump on. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.
5. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.

6. Perform the calibration three times until the desired flow rate of $\pm 5\%$ is attained.

7.2.2 Calibrating a Rotameter with an Electronic Calibrator

1. See manufacturer's manual for operational instructions.
2. Set up the calibration train as shown in (Figure 4, Appendix B) using a sampling pump, rotameter, and electronic calibrator.
3. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6° vertical.
4. Turn the electronic calibrator and sampling pump on.
5. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.
6. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.
7. Record the electronic calibrator flow rate reading and the corresponding rotameter reading. Indicate these values on the rotameter (sticker). The rotameter should be able to work within the desired flow range. Readings can also be calibrated for 10 cm³ increments for Low Flow rotameters, 500 cm³ increments for medium flow rotameters and 1 liter increments for high flow rotameters.
8. Perform the calibration three times until the desired flow rate of $\pm 5\%$ is attained. Once on site, a secondary calibrator, i.e., rotameter may be used to calibrate sampling pumps.

7.2.3 Calibrating a Personal Sampling Pump with a Rotameter

1. See manufacturer's manual for Rotameter's Operational Instructions.

2. Set up the calibration train as shown in (Figure 5, Appendix B) using a rotameter, sampling pump, and a representative sampling cassette.
 3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 ft) 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.
 4. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6° vertical.
 5. Turn the sampling pump on.
 6. Turn the flow adjust screw (or knob) on the personal sampling pump until the float ball on the rotameter is lined up with the precalibrated flow rate value. A sticker on the rotameter should indicate this value.
 7. A verification of calibration is generally performed on-site in the clean zone immediately prior to the sampling.
3. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety plan.
 4. Once on-site the calibration is performed in the clean zone. The calibration procedures are listed in Section 7.2.
 5. After calibrating the sampling pump, mobilize to the sampling location.

7.4.2 Site Sampling

1. To set up the sampling train, attach the air intake hose to the cassette base. Remove the cassette cap (Figure 6 and 7, Appendix B). The cassette should be positioned downward, perpendicular to the wind
2. If AC or DC electricity is required then turn it on. If used, the generator should be placed 10 ft. downwind from the sampling pump.
3. Record the following in a field logbook: date, time, location, sample identification number, pump number, flow rate, and cumulative time.
4. Turn the pump on. Should intermittent sampling be required, sampling filters must be covered between active periods of sampling. To cover the sample filter: turn the cassette to face upward, place the cassette cap on the cassette, remove the inlet plug from the cassette cap, attach a rotameter to the inlet opening of the cassette cap to measure the flow rate, turn off the sampling pump, place the inlet plug into the inlet opening on the cassette cap. To resume sampling: remove the inlet plug, turn on the sampling pump, attach a rotameter to measure the flow rate, remove the cassette cap, replace the inlet plug in the cassette cap and invert the cassette, face downward and perpendicular to the wind.
5. Check the pump at sampling midpoint if sampling is longer than 4 hours. The generators may need to be regassed depending on tank size. If a filter darkens in appearance or if loose dust is seen in the filter, a second sample should be started.

7.3. Meteorology

It is recommended that a meteorological station be established. If possible, sample after two to three days of dry weather and when the wind conditions are at 10 mph or greater. Record wind speed, wind direction, temperature, and pressure in a field logbook. Wind direction is particularly important when monitoring for asbestos downwind from a fixed source.

7.4 Ambient Sampling Procedures

7.4.1 Pre-site Sampling Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
2. Obtain necessary sampling equipment and ensure it is in working order and fully charged (if necessary).

6. At the end of the sampling period, orient the cassette up, turn the pump off.
7. Check the flow rate as shown in Section 7.2.3. When sampling open-faced, the sampling cap should be replaced before post calibrating. Use the same cassette used for sampling for post calibration (increase dust/fiber loading may have altered the flow rate).
8. Record the post flow rate.
9. Record the cumulative time or run.
10. Remove the tubing from the sampling cassette. Still holding the cassette upright, replace the inlet plug on the cassette cap and the outlet plug on the cassette base.

7.4.3. Post Site Sampling

1. Follow handling procedures in Section 3.2, steps 1-4.
2. Obtain an electronic or hard copy of meteorological data which occurred during the sampling event. Record weather: wind speed, ambient temperature, wind direction, and precipitation. Obtaining weather data several days prior to the sampling event can also be useful.

7.5 Indoor Sampling Procedures

PCM analysis is used for indoor air samples. When analysis shows total fiber count above the OSHA action level 0.1 f/cc then TEM (U.S. EPA's Modified Yamate Method) is used to identify asbestos from non-asbestos fibers.

Sampling pumps should be placed four to five feet above ground level away from obstructions that may influence air flow. The pump can be placed on a table or counter. Refer to Table 2 (Appendix A) for a summary of indoor sampling locations and rationale for selection.

Indoor sampling utilizes high flow rates to increased sample volumes (2000 L for PCM and 2800 to 4200 L for TEM) in order to obtain lower detection limits below the standard, (i.e., 0.01 f/cc or lower [PCM]

and 0.005 structures/cc or lower [TEM]).

7.5.1 Aggressive Sampling Procedures

Sampling equipment at fixed locations may fail to detect the presence of asbestos fibers. Due to limited air movement, many fibers may settle out of the air onto the floor and other surfaces and may not be captured on the filter. In the past, an 8-hour sampling period was recommended to cover various air circulation conditions. A quicker and more effective way to capture asbestos fibers is to circulate the air artificially so that the fibers remain airborne during sampling. The results from this sampling option typifies worst case condition. This is referred to as aggressive air sampling for asbestos. Refer to Table 2 for sample station locations.

1. Before starting the sampling pumps, direct forced air (such as a 1-horsepower leaf blower or large fan) against walls, ceilings, floors, ledges, and other surfaces in the room to initially dislodge fibers from surfaces. This should take at least 5 minutes per 1000 sq. ft. of floor.
2. Place a 20-inch fan in the center of the room. (Use one fan per 10,000 cubic feet of room space.) Place the fan on slow speed and point it toward the ceiling.
3. Follow procedures in Section 7.4.1 and 7.4.2 (Turn off the pump and then the fan(s) when sampling is complete.).
4. Follow handling procedures in Section 3.2, steps 1-4.

8.0 CALCULATIONS

The sample volume is calculated from the average flow rate of the pump multiplied by the number of minutes the pump was running (volume = flow rate X time in minutes). The sample volume should be submitted to the laboratory and identified on the chain of custody for each sample (zero for lot, field and trip blanks).

The concentration result is calculated using the sample volume and the numbers of asbestos structures reported after the application of the cluster and matrix counting criteria.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Follow all QA/QC requirements from the laboratories as well as the analytical methods.

9.1 TEM Requirements

1. Examine lot blanks to determine the background asbestos structure concentration.
2. Examine field blanks to determine whether there is contamination by extraneous asbestos structures during specimen preparation.
3. Examine of laboratory blanks to determine if contamination is being introduced during critical phases of the laboratory program.
4. To determine if the laboratory can satisfactorily analyze samples of known asbestos structure concentrations, reference filters shall be examined. Reference filters should be maintained as part of the laboratory's Quality Assurance program.
5. To minimize subjective effects, some specimens should be recounted by a different microscopist.
6. Asbestos laboratories shall be accredited by the National Voluntary Laboratory Accreditation Program.
7. At this time, performance evaluation samples for asbestos in air are not available for Removal Program Activities.

9.2 PCM Requirements

1. Examine reference slides of known concentration to determine the analyst's ability to satisfactorily count fibers. Reference slides should be maintained as part of the laboratory's quality assurance program.
2. Examine field blanks to determine if there is contamination by extraneous structures during sample handling.

3. Some samples should be relabeled then submitted for counting by the same analyst to determine possible bias by the analyst.
4. Participation in a proficiency testing program such as the AIHA-NIOSH proficiency analytical testing (PAT) program.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results accordingly with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures. More specifically, when entering an unknown situation involving asbestos, a powered air purifying respirator (PAPR) (full face-piece) is necessary in conjunction with HEPA filter cartridges. See applicable regulations for action level, PEL, TLV, etc. If previous sampling indicates asbestos concentrations are below personal health and safety levels, then Level D personal protection is adequate.

12.0 REFERENCES

- (1) Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air, Part 1: Method, EPA/540/2-90/005a, May 1990, and Part 2: Technical Background Document, EPA/540/2-90/005b, May 1990.
- (2) Methodology for the Measurement of Airborne Asbestos by Electron Microscopy, EPA's Report No. 68-02-3266, 1984, G. Yamate, S.C. Agarwal, and R. D. Gibbons.
- (3) National Institute for Occupational Safety and Health. NIOSH Manual of Analytical Method. Third Edition. 1987.
- (4) U.S. Environmental Protection Agency. Code of Federal Regulations 40 CFR 763. July 1, 1987. Code of Federal Regulations 40 CFR 763 Addendum. October 30, 1987.

(5) U.S. Environmental Protection Agency.
Asbestos-Containing Materials in Schools;
Final Rule and Notice. 52 FR 41826.

(6) Occupational Safety and Health
Administration. Code of Federal Regulations
29 CFR 1910.1001. Washington, D.C.
1987.

APPENDIX A

Tables

TABLE 1. SAMPLE STATIONS FOR OUTDOOR SAMPLING		
Sample Station Location	Sample Numbers	Rationale
Upwind/Background ⁽¹⁾	Collect a minimum of two simultaneous upwind/background samples 30° apart from the prevailing windlines.	Establishes background fiber levels.
Downwind	Deploy a minimum of 3 sampling stations in a 180 degree arc downwind from the source.	Indicates if asbestos is leaving the site.
Site Representative and/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

⁽¹⁾ More than one background station may be required if the asbestos originates from different sources.

APPENDIX A (Cont'd)

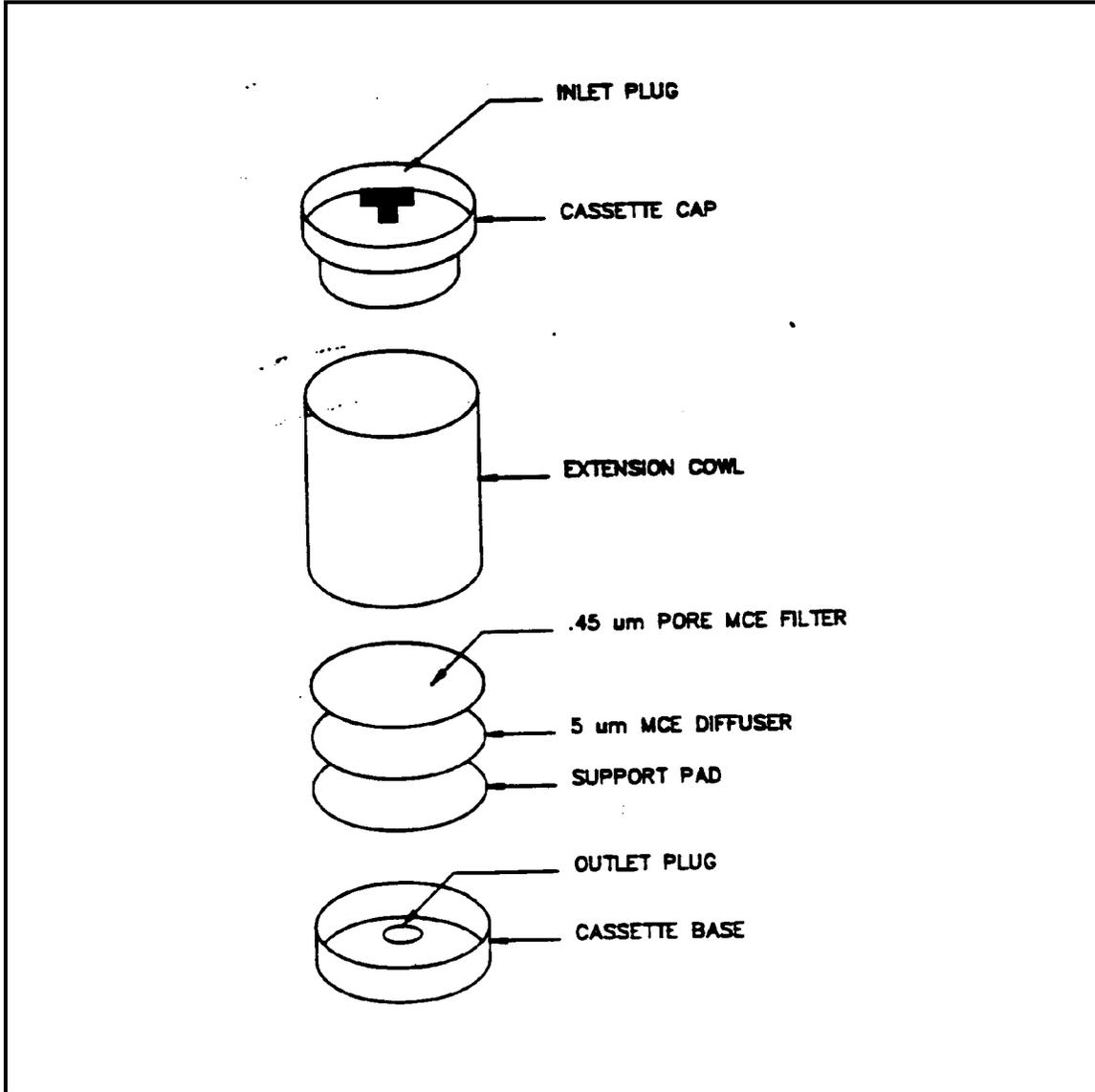
Tables

TABLE 2 SAMPLE STATIONS FOR INDOOR SAMPLING		
Sample Station Location	Sample Numbers	Rationale
Indoor Sampling	<p>If a work site is a single room, disperse 5 samplers throughout the room.</p> <p>If the work site contains up to 5 rooms, place at least one sampler in each room.</p> <p>If the work site contains more than 5 rooms, select a representative sample of the rooms.</p>	Establishes representative samples from a homogeneous area.
Upwind/Background	If outside sources are suspected, deploy a minimum of two simultaneous upwind/background samples 30° apart from the prevailing windlines.	Establish whether indoor asbestos concentrations are coming from an outside source.
Worst Case	Obtain one worst case sample, i.e., aggressive sampling (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

APPENDIX B

Figures

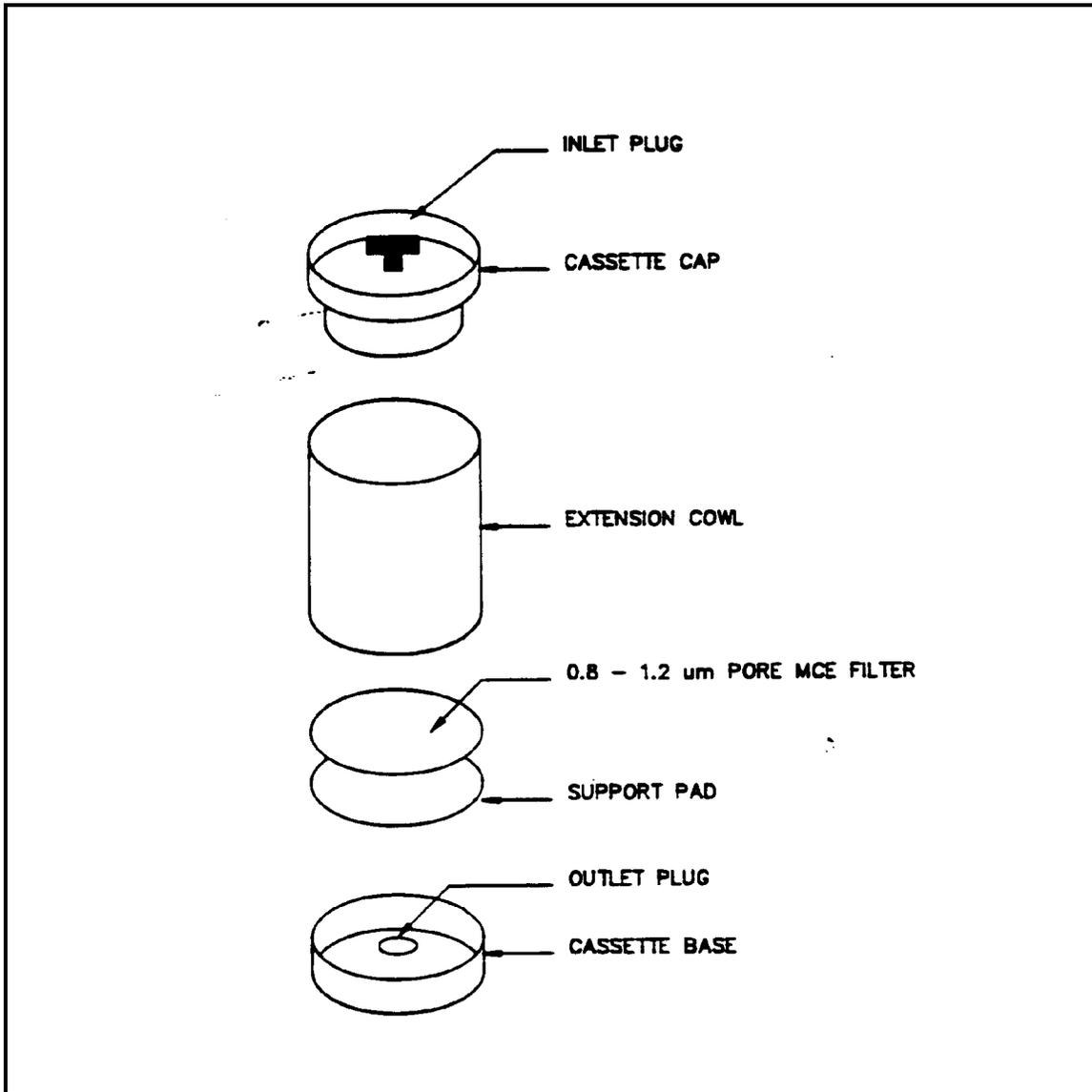
FIGURE 1. Transmission Electron Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

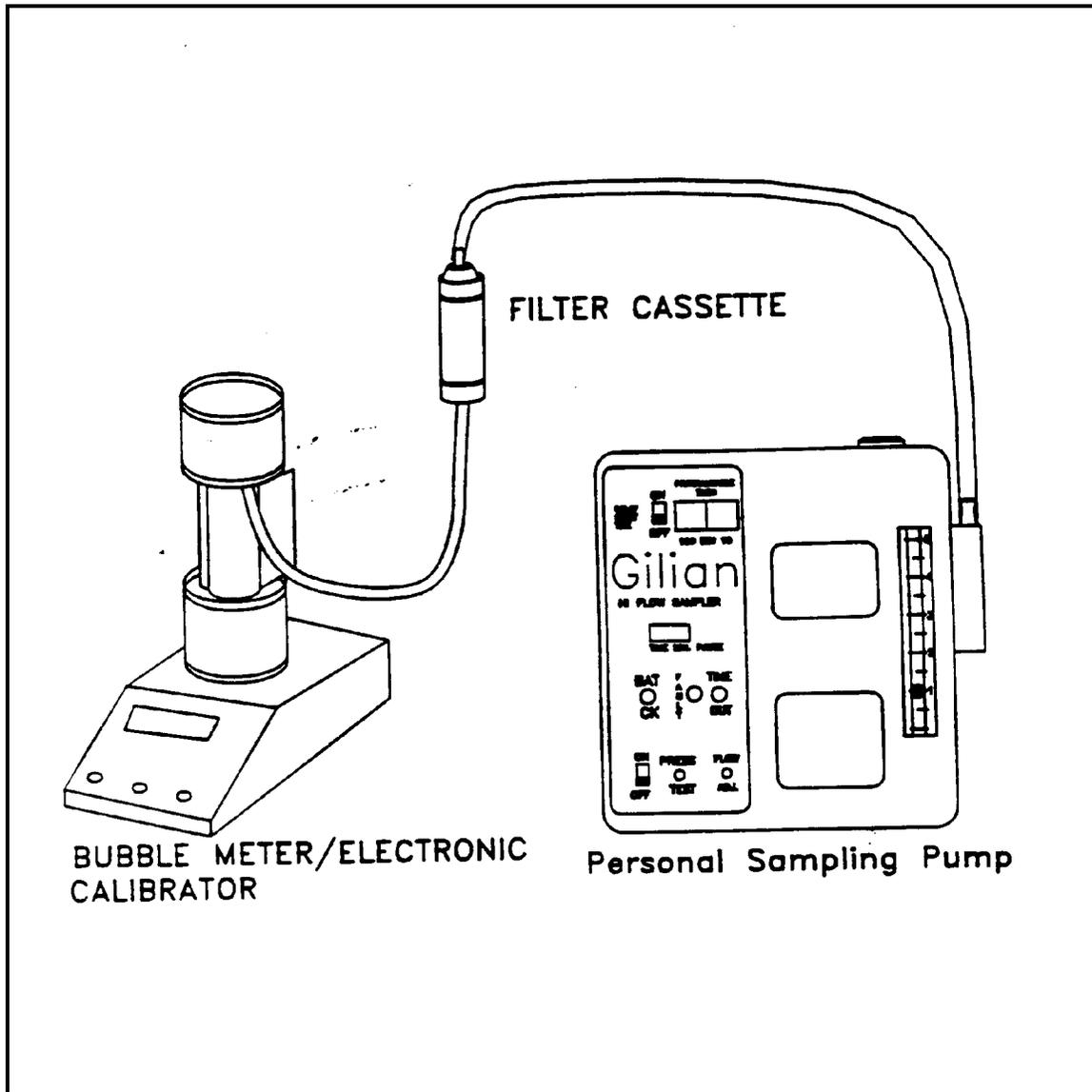
FIGURE 2. Phase Contrast Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

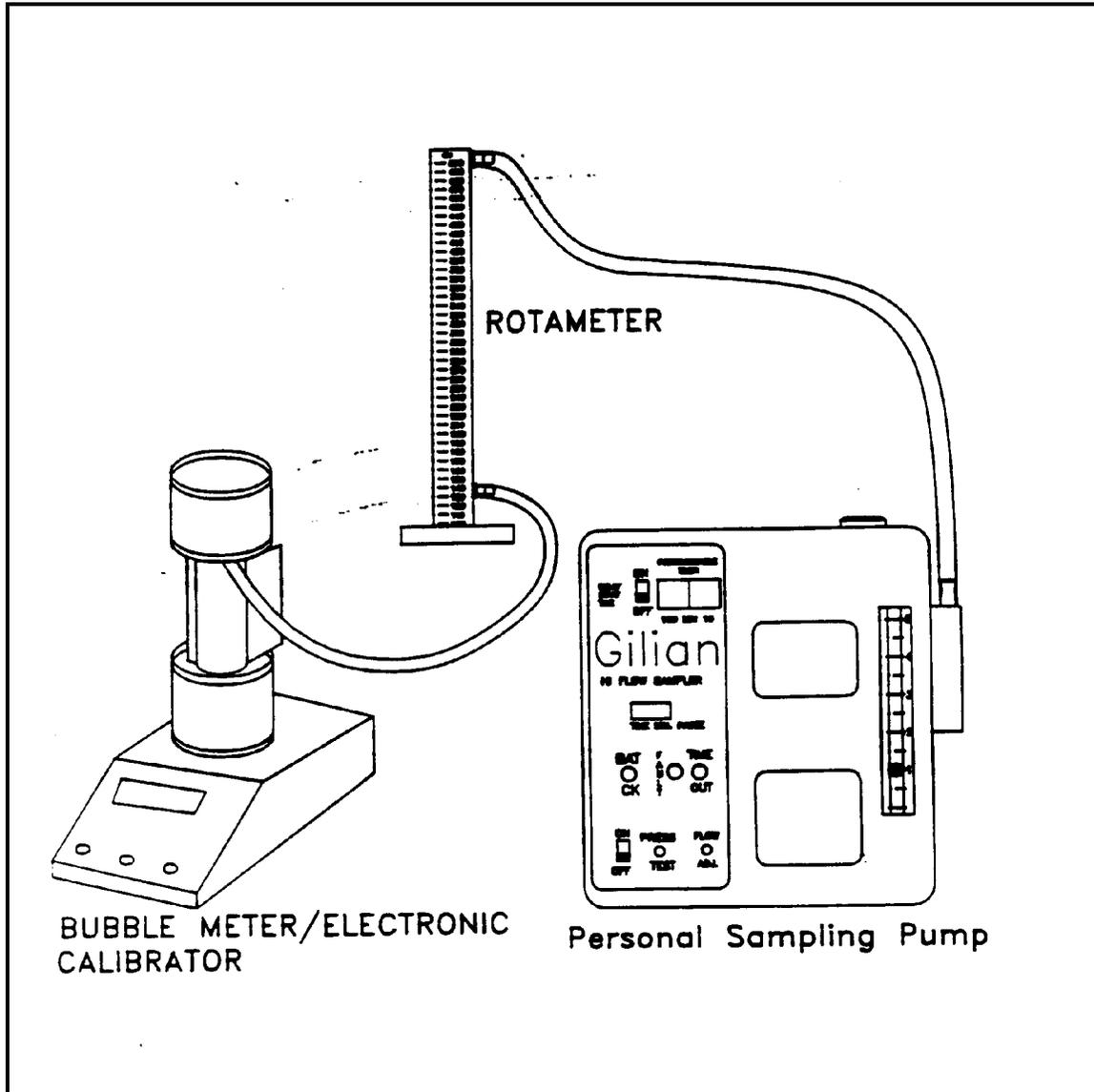
FIGURE 3. Calibrating a Personal Sampling Pump with a Bubble Meter



APPENDIX B (Cont'd)

Figures

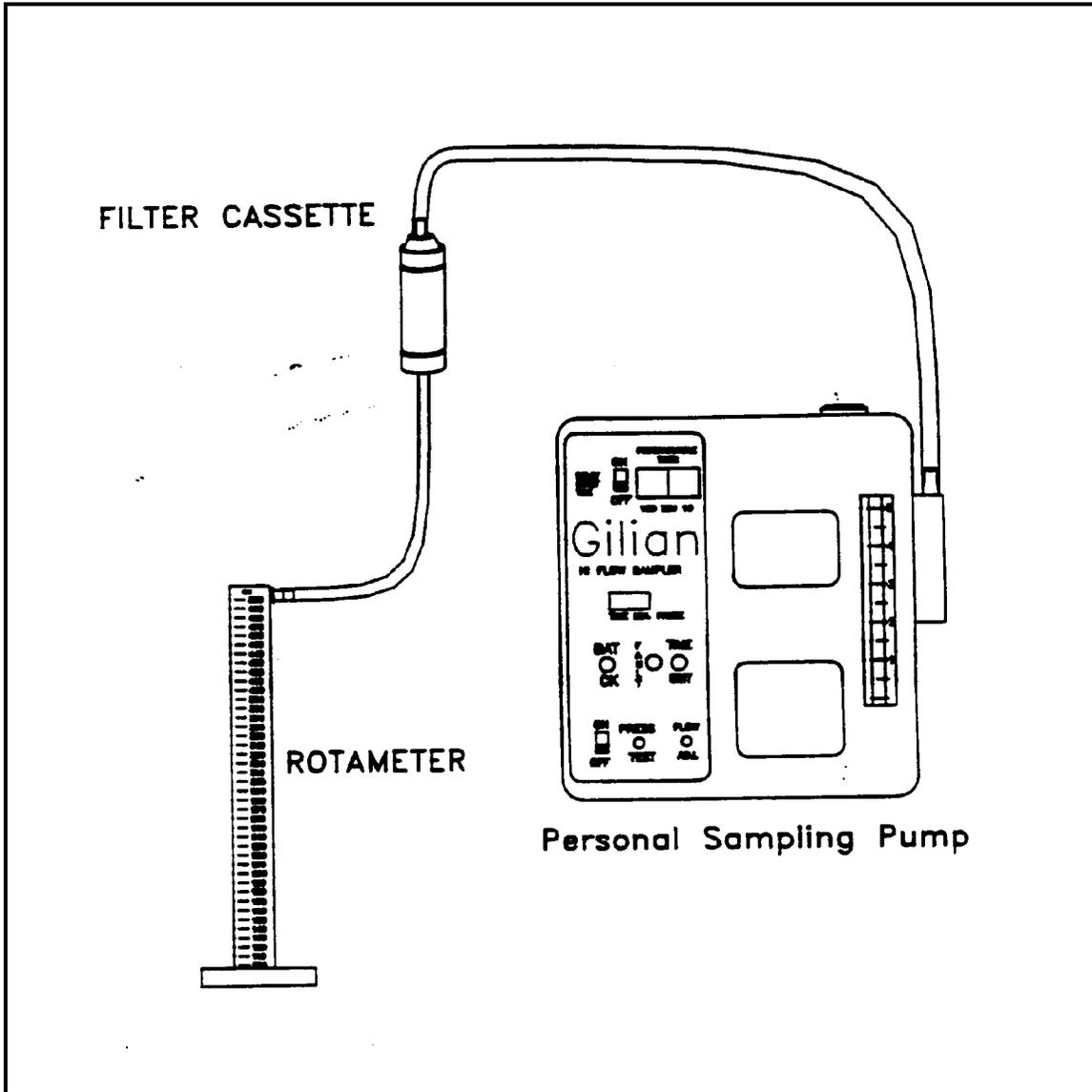
FIGURE 4. Calibrating a Rotameter with a Bubble Meter



APPENDIX B (Cont'd)

Figures

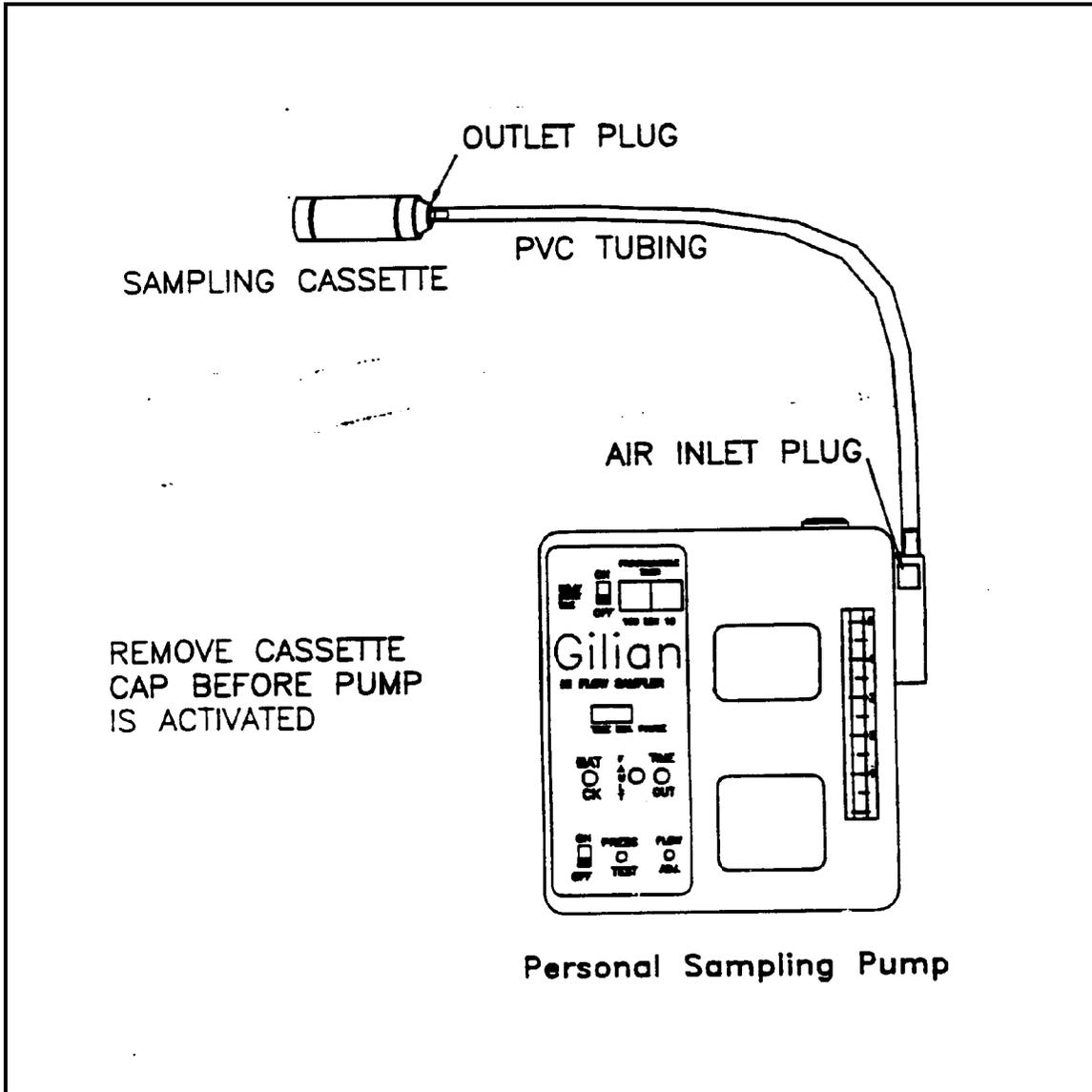
FIGURE 5. Calibrating a Sampling Pump with a Rotameter



APPENDIX B (Cont'd)

Figures

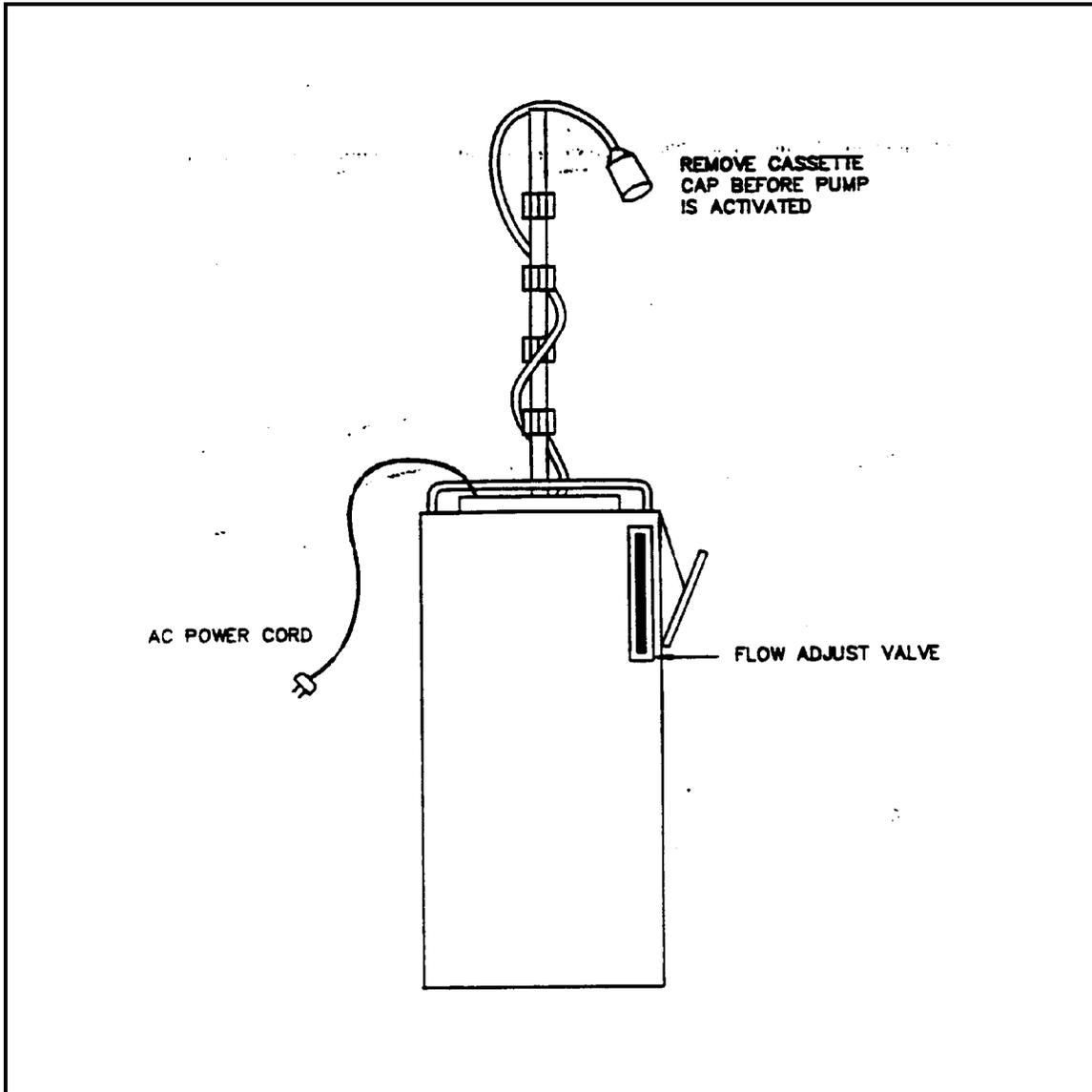
FIGURE 6. Personal Sampling Train for Asbestos



APPENDIX B (Cont'd)

Figures

FIGURE 7. High Flow Sampling Train for Asbestos



APPENDIX D

Data Quality Objectives

APPENDIX D

DATA QUALITY OBJECTIVE NO. 1 SITE NAME: SOUTHWEST VERMICULITE MEDIA OF CONCERN: SOIL/AIR

STEP 1. STATE THE PROBLEM	
Determine if concentrations of amphibole asbestos in the soil and ambient air exceed the site-specific action levels as determined by U.S. EPA.	
STEP 2. IDENTIFY THE DECISION	
Is the concentration of amphibole asbestos in soil and ambient air represented by a sample above the site-specific action level?	
IDENTIFY THE ALTERNATIVE ACTIONS THAT MAY BE TAKEN BASED ON THE DECISIONS.	<ul style="list-style-type: none"> • If the average concentration of the contaminant exceeds the site-specific action level in soil and ambient air, the soil represented by that sample will still be considered contaminated and will require additional soil excavation. If the detected concentration of the ambient air sample exceeds the AHERA PEL, additional dust suppression activities must occur to lessen the likely community exposure to airborne amphibole asbestos fibers • If the concentration of the contaminant does not exceed the site-specific action levels in soil and the ambient air, the soil/ambient air represented by that sample will not require additional excavation/dust suppression activities.
STEP 3. IDENTIFY INPUTS TO THE DECISION	
IDENTIFY THE INFORMATIONAL INPUTS NEEDED TO RESOLVE A DECISION.	Contaminant concentrations in soil/ambient air samples collected from contaminated soil grids and perimeter air sample stations.
IDENTIFY THE SOURCES FOR EACH INFORMATIONAL INPUT AND LIST THE INPUTS THAT ARE OBTAINED THROUGH ENVIRONMENTAL MEASUREMENTS.	<ul style="list-style-type: none"> • Soil/ambient air samples. • Analytical results from asbestos analysis
BASIS FOR THE CONTAMINANT SPECIFIC ACTION LEVELS.	For PLM Analysis (Soil): 0.25% amphibole asbestos For PCM Analysis (Ambient Air): 0.01 f/cc; and For TEM Analysis (Ambient Air): 0.01 asbestos f/cc
IDENTIFY POTENTIAL SAMPLING TECHNIQUES AND APPROPRIATE ANALYTICAL METHODS.	<p>Composite soil confirmation samples will be collected according to ERT SOP No. 2012, and will be submitted for PLM, utilizing SRC-Libby-03 methodology.</p> <p>Ambient air samples will be collected according ERT SOP No. 2015, and will be submitted for PCM analysis, utilizing NIOSH 7400 methodology. If PCM fiber concentrations exceed 0.01 f/cc, the samples will be re-analyzed by TEM, utilizing ISO 10312 methodology to determine actual concentration of asbestos and asbestos fiber types.</p>

STEP 4. DEFINE THE BOUNDARIES OF THE STUDY	
DEFINE THE DOMAIN OR GEOGRAPHICAL AREA WITHIN WHICH ALL DECISIONS MUST APPLY.	<p>SOIL: Area C, Lot 7: Grid AC7-001 (Figure 4) Area C, Lot 8: Grids AC8-005, AC8-007, and AC8-008 (Figure 4) Area C, Lot 9: Grids AC9-009 and AC9-010 (figure 4) AMBIENT AIR: To Be Determined on daily basis, based on scheduled site activities.</p>
SPECIFY THE CHARACTERISTICS THAT DEFINE THE POPULATION OF INTEREST.	Amphibole asbestos concentrations in the soil and ambient air.
DEFINE THE SCALE OF THE DECISION MAKING.	The scale of decision will be for the grid area represented by each sample collected from the soil.
DETERMINE THE TIMEFRAME TO WHICH THE DATA APPLY.	The data will apply until the source of amphibole asbestos represented by the sample receives appropriate response actions.
DETERMINE WHEN TO COLLECT THE DATA.	Samples will be collected during the removal field activities.
IDENTIFY PRACTICAL CONSTRAINTS ON DATA COLLECTION.	<ul style="list-style-type: none"> • Inclement weather conditions.
STEP 5. DEVELOP A DECISION RULE	
SPECIFY THE PARAMETER THAT CHARACTERIZES THE POPULATION OF INTEREST.	The average sample concentration of each sample grid will be compared to the site-specific action level.
SPECIFY THE ACTION LEVEL FOR THE DECISION.	<p>SOIL: 0.25 % asbestos in soil as determined by U.S. EPA.</p> <p>AMBIENT AIR: 0.01 f/cc as determined by the AHERA PEL; 0.01 asbestos f/cc as determined by U.S. EPA.</p>
DEVELOP A DECISION RULE.	<p>SOIL: If any average soil confirmation sample concentration is above 0.25%, then the soil in the grid represented by that sample may require additional excavation to remove the threat of potential asbestos exposure. Else the soil does not require additional excavation. However, it should be noted that asbestos concentrations determined to be less than 0.25% maybe further investigated by EPA with the use of Activity Based Sampling (ABS).</p> <p>AMBIENT AIR: If any average ambient air concentration exceeds 0.01 f/cc and 0.01 asbestos f/cc, then additional dust suppression activities may be instituted to prevent potential community exposure to amphibole asbestos contamination in the ambient air. Conversely, if the average ambient air concentration does not exceed 0.01 f/cc, the currently used dust suppression activities will be considered adequate to prevent the community from exposure to amphibole asbestos.</p>

STEP 6. SPECIFY THE LIMITS ON DECISION ERRORS	
<p>DETERMINE THE POSSIBLE RANGE OF THE PARAMETER OF INTEREST.</p>	<p><u>SOIL:</u> Concentrations may range from greater than 0% by weight to greater than 0.25% by PLM analysis</p> <p><u>AMBIENT AIR:</u> Concentrations may range from non-detect (ND) to greater than 0.01 f/cc for PCM and ND to greater than 0.01 asbestos f/cc for TEM.</p>
<p>DEFINE BOTH TYPES OF DECISION ERRORS AND IDENTIFY THE POTENTIAL CONSEQUENCES OF EACH.</p>	<p><u>SOIL:</u> <u>Type I Error:</u> Deciding that the average concentration of amphibole asbestos in the specified area represented by the soil sample does not exceed the site-specific action level when, in truth, the average concentration exceeds its site specific action level. The consequence of this decision error is that contaminated soil will remain in place, possibly endangering human health. There may also be potential future liability associated with cleanup costs of leaving contamination in place. This decision error is more severe. <u>Type II Error:</u> Deciding that the average concentration of amphibole asbestos in specific area represented by the soil/dust sample does exceed the site-specific action level when, in truth, it does not. The consequences of this decision error are that remediation of the specified area will continue and unnecessary costs will be incurred.</p> <p><u>AMBIENT AIR:</u> <u>Type I Error:</u> Deciding that the average concentration of amphibole asbestos in the specified ambient air represented by the air sample does not exceed the site-specific action level when, in truth, the average concentration exceeds its site specific action level. The consequence of this decision error is that the dust suppression activities currently being utilized will continue to be used, causing potential community exposure to amphibole asbestos in the ambient air. This decision error is more severe. <u>Type II Error:</u> Deciding that the average concentration of amphibole asbestos in the ambient air represented by the air sample sample does exceed the site-specific action level when, in truth, it does not. The consequence of this decision error is that additional dust suppression activities may be utilized, causing an increase in costs to eliminate the potential community exposure to amphibole asbestos.</p>
<p>ESTABLISH THE TRUE STATE OF NATURE FOR EACH DECISION RULE.</p>	<p><u>SOIL:</u> The true state of nature is that the average concentration of amphibole asbestos in the grid is above the site-specific action level of 0.25%.</p> <p><u>AMBIENT AIR:</u> The true state of nature is that the average concentration of amphibole asbestos in the ambient air is above the AHERA PEL of 0.01 f/cc.</p>

<p>DEFINE THE TRUE STATE OF NATURE FOR THE MORE SEVERE DECISION ERROR AS THE BASELINE CONDITION OR THE NULL HYPOTHESIS (H₀), AND DEFINE THE TRUE STATE FOR THE LESS SEVERE DECISION ERROR AS THE ALTERNATIVE HYPOTHESIS (H_a).</p>	<p>SOIL: H₀: The average concentration of amphibole asbestos in the soil confirmation sample of the specified area is above the site-specific action level. H_a: The average concentration of amphibole asbestos in the soil confirmation sample of the specified area is below the site-specific action level. AMBIENT AIR: H₀: The average concentration of fibers or amphibole asbestos in the ambient air sample of the specified area is above the site-specific action level. H_a: The average concentration of fibers or amphibole asbestos in the ambient air sample of the specified area is below the site-specific action level.</p>
<p>ASSIGN THE TERMS “FALSE POSITIVE” AND “FALSE NEGATIVE” TO THE PROPER DECISION ERRORS.</p>	<ul style="list-style-type: none"> • False Negative Error = Type I • False Positive Error = Type II
<p>ASSIGN THE PROBABILITY VALUES TO POINTS ABOVE AND BELOW THE ACTION LEVEL THAT REFLECT THE ACCEPTABLE PROBABILITY FOR THE OCCURENCES OF DECISION ERRORS.</p>	<p>To be assigned based on discussions with EPA OSC’s.</p>
<p>STEP 7. OPTIMIZE THE DESIGN</p>	
<p>REVIEW THE DQOs.</p>	<p>Due to insufficient historical data, determination of the standard deviation was not possible. Therefore, sample size calculation using the traditional statistical formula may not be the optimal design. In order to select the optimal sampling program that satisfies the DQOs and is the most resource effective, other elements were considered.</p>
<p>DEVELOP GENERAL SAMPLING AND ANALYSIS DESIGN. SOIL: A total of 6 grid locations have been identified within Area C. Soil confirmation samples will be collected from Area C utilizing ERT SOP No. 2012. These samples will be analyzed by PLM (SRC-Libby-03). The data will be used to determine if the results are above the U.S. EPA site-specific action level of 0.25%. Elevated results may indicate additional soil excavation activities to eliminate the potential exposure threat of amphibole asbestos top the local community. AMBIENT AIR: The number of ambient air samples and their corresponding locations will be determined at the time of sampling activities. It is estimated that at least 100 ambient air samples will be collected. The ambient air samples will be collected according to ERT SOP No. 2015 and will be analyzed by PCM (NIOSH 7400) and possibly by TEM (ISO 10312).</p>	

APPENDIX E

EPA ERT SOP No. 2000 – General Field Sampling Guidelines



GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of

material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

- (1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.
- (2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

Grab Samples

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Composite Samples

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have

been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

- C Objective and purpose of the investigation.
- C Basis upon which data will be evaluated.
- C Information known about the site including location, type and size of the facility, and length of operations/abandonment.
- C Type and volume of contaminated material, contaminants of concern (including

concentration), and basis of the information/data.

- C Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
- C Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
- C QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate

documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.

APPENDIX F

EPA ERT SOP No. 2006 – Sample Decontamination



SAMPLING EQUIPMENT DECONTAMINATION

SOP#: 2006
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination and to provide general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure

water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

1. Physical removal
2. Non-phosphate detergent wash
3. Tap water rinse
4. Distilled/deionized water rinse
5. 10% nitric acid rinse
6. Distilled/deionized water rinse
7. Solvent rinse (pesticide grade)
8. Air dry
9. Distilled/deionized water rinse

If a particular contaminant fraction is not present at the site, the nine (9) step decontamination procedure specified above may be modified for site specificity. For example, the nitric acid rinse may be eliminated if metals are not of concern at a site. Similarly, the solvent rinse may be eliminated if organics are not of

concern at a site. Modifications to the standard procedure should be documented in the site specific work plan or subsequent report.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.

More specifically, sample collection and analysis of decontamination waste may be required before beginning proper disposal of decontamination liquids and solids generated at a site. This should be determined prior to initiation of site activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

C The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free (specifically for the contaminants of concern).

C The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.

C If acids or solvents are utilized in decontamination they raise health and safety, and waste disposal concerns.

C Damage can be incurred by acid and solvent washing of complex and sophisticated sampling equipment.

5.0 EQUIPMENT/APPARATUS

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment. Most equipment and supplies can be easily procured. For example, soft-

bristle scrub brushes or long-handled bottle brushes can be used to remove contaminants. Large galvanized wash tubs, stock tanks, or buckets can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags can help segregate contaminated equipment. Contaminated liquid can be stored temporarily in metal or plastic cans or drums.

The following standard materials and equipment are recommended for decontamination activities:

5.1 Decontamination Solutions

- C Non-phosphate detergent
- C Selected solvents (acetone, hexane, nitric acid, etc.)
- C Tap water
- C Distilled or deionized water

5.2 Decontamination Tools/Supplies

- C Long and short handled brushes
- C Bottle brushes
- C Drop cloth/plastic sheeting
- C Paper towels
- C Plastic or galvanized tubs or buckets
- C Pressurized sprayers (H₂O)
- C Solvent sprayers
- C Aluminum foil

5.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, emergency eye wash)

5.4 Waste Disposal

- C Trash bags
- C Trash containers
- C 55-gallon drums
- C Metal/plastic buckets/containers for storage and disposal of decontamination solutions

6.0 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 (Appendix A) lists solvent rinses which may be required for elimination of particular chemicals. In

general, the following solvents are typically utilized for decontamination purposes:

- C 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a contaminant of concern.
- C Acetone (pesticide grade)⁽¹⁾
- C Hexane (pesticide grade)⁽¹⁾
- C Methanol⁽¹⁾

⁽¹⁾ - Only if sample is to be analyzed for organics.

7.0 PROCEDURES

As part of the health and safety plan, a decontamination plan should be developed and reviewed. The decontamination line should be set up before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- C The number, location, and layout of decontamination stations.
- C Decontamination equipment needed.
- C Appropriate decontamination methods.
- C Methods for disposal of contaminated clothing, equipment, and solutions.
- C Procedures can be established to minimize the potential for contamination. This may include: (1) work practices that minimize contact with potential contaminants; (2) using remote sampling techniques; (3) covering monitoring and sampling equipment with plastic, aluminum foil, or other protective material; (4) watering down dusty areas; (5) avoiding laying down equipment in areas of obvious contamination; and (6) use of disposable sampling equipment.

7.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate

contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

7.1.1 Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive methods are available:

Mechanical

Mechanical methods of decontamination include using metal or nylon brushes. The amount and type of contaminants removed will vary with the hardness of bristles, length of time brushed, degree of brush contact, degree of contamination, nature of the surface being cleaned, and degree of contaminant adherence to the surface.

Air Blasting

Air blasting equipment uses compressed air to force abrasive material through a nozzle at high velocities. The distance between nozzle and surface cleaned, air pressure, time of application, and angle at which the abrasive strikes the surface will dictate cleaning efficiency. Disadvantages of this method are the inability to control the amount of material removed and the large amount of waste generated.

Wet Blasting

Wet blast cleaning involves use of a suspended fine abrasive. The abrasive/water mixture is delivered by compressed air to the contaminated area. By using a very fine abrasive, the amount of materials removed can be carefully controlled.

7.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods.

Low-Pressure Water

This method consists of a container which is filled with water. The user pumps air out of the container to create a vacuum. A slender nozzle and hose allow the user to spray in hard-to-reach places.

High-Pressure Water

This method consists of a high-pressure pump, an operator controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) and flow rates usually range from 20 to 140 liters per minute.

Ultra-High-Pressure Water

This system produces a water jet that is pressured from 1,000 to 4,000 atmospheres. This ultra-high-pressure spray can remove tightly-adhered surface films. The water velocity ranges from 500 meters/second (m/s) (1,000 atm) to 900 m/s (4,000 atm). Additives can be used to enhance the cleaning action.

Rinsing

Contaminants are removed by rinsing through dilution, physical attraction, and solubilization.

Damp Cloth Removal

In some instances, due to sensitive, non-waterproof equipment or due to the unlikelihood of equipment being contaminated, it is not necessary to conduct an extensive decontamination procedure. For example, air sampling pumps hooked on a fence, placed on a drum, or wrapped in plastic bags are not likely to become heavily contaminated. A damp cloth should be used to wipe off contaminants which may have adhered to equipment through airborne contaminants or from surfaces upon which the equipment was set.

Disinfection/Sterilization

Disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization methods are impractical for large equipment. This method of decontamination is typically performed off-site.

7.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each decontamination station by a minimum of three (3) feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line.

A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC) which is in the CRZ. Figure 1 (Appendix B) shows a typical contaminant reduction zone layout. The CRC controls access into and out of the exclusion zone and confines decontamination activities to a limited area. The CRC boundaries should be conspicuously marked. The far end is the hotline, the boundary between the exclusion zone and the contamination reduction zone. The size of the decontamination corridor depends on the number of stations in the decontamination process, overall dimensions of the work zones, and amount of space available at the site. Whenever possible, it should be a straight line.

Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Another corridor may be required for the entry and exit of heavy equipment. Sampling and monitoring equipment and sampling supplies are all maintained outside of the CRC. Personnel don their equipment away from the CRC and enter the exclusion zone through a separate access control point at the hotline. One person (or more) dedicated to decontaminating equipment is recommended.

7.2.1 Decontamination Setup

Starting with the most contaminated station, the decontamination setup should be as follows:

Station 1: Segregate Equipment Drop

Place plastic sheeting on the ground (Figure 2, Appendix B). Size will depend on amount of

equipment to be decontaminated. Provide containers lined with plastic if equipment is to be segregated. Segregation may be required if sensitive equipment or mildly contaminated equipment is used at the same time as equipment which is likely to be heavily contaminated.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

As indicated in 7.1.2, a high-pressure wash may be required for compounds which are difficult to remove by washing with brushes. The elevated temperature of the water from the high-pressure washers is excellent at removing greasy/oily compounds. High pressure washers require water and electricity.

A decontamination pad may be required for the high-pressure wash area. An example of a wash pad may consist of an approximately 1 1/2 foot-deep basin lined with plastic sheeting and sloped to a sump at one corner. A layer of sand can be placed over the plastic and the basin is filled with gravel or shell. The sump is also lined with visqueen and a barrel is placed in the hole to prevent collapse. A sump pump is used to remove the water from the sump for transfer into a drum.

Typically heavy machinery is decontaminated at the end of the day unless site sampling requires that the machinery be decontaminated frequently. A separate decontamination pad may be required for heavy equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Prior to setting up Station 3, place plastic sheeting on the ground to cover areas under Station 3 through Station 10.

Fill a wash basin, a large bucket, or child's swimming pool with non-phosphate detergent and tap water. Several bottle and bristle brushes to physically remove contamination should be dedicated to this station. Approximately 10 - 50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 4: Water Basin

Fill a wash basin, a large bucket, or child's swimming

pool with tap water. Several bottle and bristle brushes should be dedicated to this station. Approximately 10-50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 5: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to contain the water during the rinsing process. Approximately 10-20 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 6: Nitric Acid Sprayers

Fill a spray bottle with 10% nitric acid. An acid rinse may not be required if inorganics are not a contaminant of concern. The amount of acid will depend on the amount of equipment to be decontaminated. Provide a 5-gallon bucket or basin to collect acid during the rinsing process.

Station 7: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 8: Organic Solvent Sprayers

Fill a spray bottle with an organic solvent. After each solvent rinse, the equipment should be rinsed with distilled/deionized water and air dried. Amount of solvent will depend on the amount of equipment to decontaminate. Provide a 5-gallon bucket or basin to collect the solvent during the rinsing process.

Solvent rinses may not be required unless organics are a contaminant of concern, and may be eliminated from the station sequence.

Station 9: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 10: Clean Equipment Drop

Lay a clean piece of plastic sheeting over the bottom

plastic layer. This will allow easy removal of the plastic in the event that it becomes dirty. Provide aluminum foil, plastic, or other protective material to wrap clean equipment.

7.2.2 Decontamination Procedures

Station 1: Segregate Equipment Drop

Deposit equipment used on-site (i.e., tools, sampling devices and containers, monitoring instruments radios, clipboards, etc.) on the plastic drop cloth/sheet or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross contamination. Loose leaf sampling data sheets or maps can be placed in plastic zip lock bags if contamination is evident.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

Use high pressure wash on grossly contaminated equipment. Do not use high- pressure wash on sensitive or non-waterproof equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Scrub equipment with soap and water using bottle and bristle brushes. Only sensitive equipment (i.e., radios, air monitoring and sampling equipment) which is waterproof should be washed. Equipment which is not waterproof should have plastic bags removed and wiped down with a damp cloth. Acids and organic rinses may also ruin sensitive equipment. Consult the manufacturers for recommended decontamination solutions.

Station 4: Equipment Rinse

Wash soap off of equipment with water by immersing the equipment in the water while brushing. Repeat as many times as necessary.

Station 5: Low-Pressure Rinse

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 6: Nitric Acid Sprayers (required only if metals are a contaminant of concern)

Using a spray bottle rinse sampling equipment with nitric acid. Begin spraying (inside and outside) at one end of the equipment allowing the acid to drip to the other end into a 5-gallon bucket. A rinsate blank may be required at this station. Refer to Section 9.

Station 7: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 8: Organic Solvent Sprayers

Rinse sampling equipment with a solvent. Begin spraying (inside and outside) at one end of the equipment allowing the solvent to drip to the other end into a 5-gallon bucket. Allow the solvent to evaporate from the equipment before going to the next station. A QC rinsate sample may be required at this station.

Station 9: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure washer.

Station 10: Clean Equipment Drop

Lay clean equipment on plastic sheeting. Once air dried, wrap sampling equipment with aluminum foil, plastic, or other protective material.

7.2.3 Post Decontamination Procedures

1. Collect high-pressure pad and heavy equipment decontamination area liquid and waste and store in appropriate drum or container. A sump pump can aid in the collection process. Refer to the Department of Transportation (DOT) requirements for appropriate containers based on the contaminant of concern.
2. Collect high-pressure pad and heavy equipment decontamination area solid waste and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.
3. Empty soap and water liquid wastes from basins and buckets and store in appropriate

drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

4. Empty acid rinse waste and place in appropriate container or neutralize with a base and place in appropriate drum. pH paper or an equivalent pH test is required for neutralization. Consult DOT requirements for appropriate drum for acid rinse waste.
5. Empty solvent rinse sprayer and solvent waste into an appropriate container. Consult DOT requirements for appropriate drum for solvent rinse waste.
6. Using low-pressure sprayers, rinse basins, and brushes. Place liquid generated from this process into the wash water rinse container.
7. Empty low-pressure sprayer water onto the ground.
8. Place all solid waste materials generated from the decontamination area (i.e., gloves and plastic sheeting, etc.) in an approved DOT drum. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.
9. Write appropriate labels for waste and make arrangements for disposal. Consult DOT regulations for the appropriate label for each drum generated from the decontamination process.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks are samples obtained by running analyte free water over decontaminated sampling

equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples are treated identical to samples collected that day. A rinsate blank is used to assess cross contamination brought about by improper decontamination procedures. Where dedicated sampling equipment is not utilized, collect one rinsate blank per day per type of sampling device samples to meet QA2 and QA3 objectives.

If sampling equipment requires the use of plastic tubing it should be disposed of as contaminated and replaced with clean tubing before additional sampling occurs.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow OSHA, U.S. EPA, corporate, and other applicable health and safety procedures.

Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

The decontamination solutions must be determined to be acceptable before use. Decontamination materials may degrade protective clothing or equipment; some solvents can permeate protective clothing. If decontamination materials do pose a health hazard, measures should be taken to protect personnel or substitutions should be made to eliminate the hazard. The choice of respiratory protection based on contaminants of concern from the site may not be appropriate for solvents used in the decontamination process.

Safety considerations should be addressed when using abrasive and non-abrasive decontamination

equipment. Maximum air pressure produced by abrasive equipment could cause physical injury. Displaced material requires control mechanisms.

Material generated from decontamination activities requires proper handling, storage, and disposal. Personal Protective Equipment may be required for these activities.

Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard (i.e., acetone, alcohol, and trisodiumphosphate).

In some jurisdictions, phosphate containing detergents (i.e., TSP) are banned.

12.0 REFERENCES

Field Sampling Procedures Manual, New Jersey Department of Environmental Protection, February, 1988.

A Compendium of Superfund Field Operations Methods, EPA 540/p-87/001.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1, 1986.

Guidelines for the Selection of Chemical Protective Clothing, Volume 1, Third Edition, American Conference of Governmental Industrial Hygienists, Inc., February, 1987.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, October, 1985.

APPENDIX A

Table

Table 1. Soluble Contaminants and Recommended Solvent Rinse

TABLE 1 Soluble Contaminants and Recommended Solvent Rinse		
SOLVENT ⁽¹⁾	EXAMPLES OF SOLVENTS	SOLUBLE CONTAMINANTS
Water	Deionized water Tap water	Low-chain hydrocarbons Inorganic compounds Salts Some organic acids and other polar compounds
Dilute Acids	Nitric acid Acetic acid Boric acid	Basic (caustic) compounds (e.g., amines and hydrazines)
Dilute Bases	Sodium bicarbonate (e.g., soap detergent)	Acidic compounds Phenol Thiols Some nitro and sulfonic compounds
Organic Solvents ⁽²⁾	Alcohols Ethers Ketones Aromatics Straight chain alkalines (e.g., hexane) Common petroleum products (e.g., fuel, oil, kerosene)	Nonpolar compounds (e.g., some organic compounds)
Organic Solvent ⁽²⁾	Hexane	PCBs

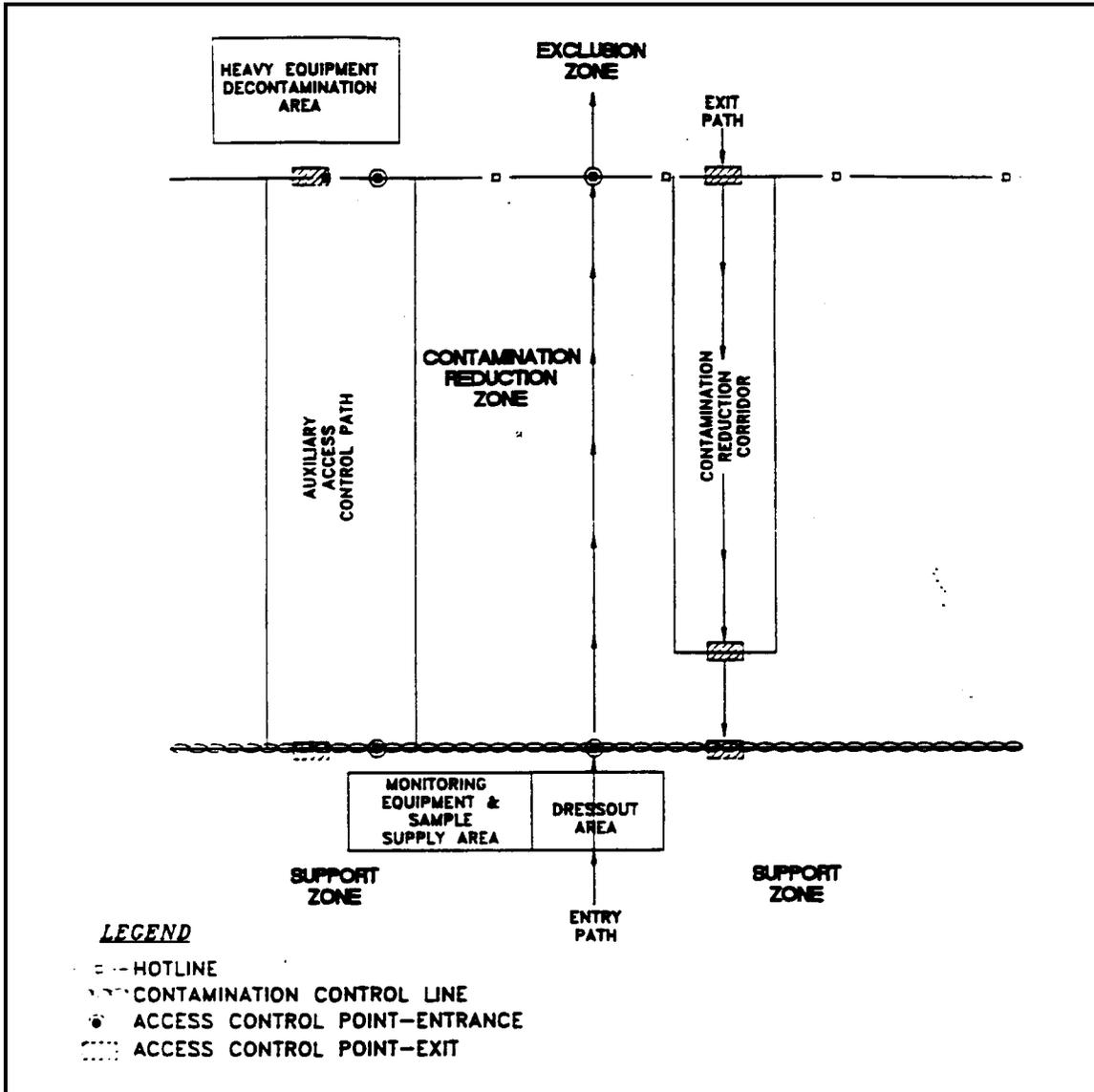
⁽¹⁾ - Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard

⁽²⁾ - WARNING: Some organic solvents can permeate and/or degrade the protective clothing

APPENDIX B

Figures

Figure 1. Contamination Reduction Zone Layout



APPENDIX B (Cont'd.)

Figures

Figure 2. Decontamination Layout

