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International Specialists in the Environment

SCOPE OF WORK
Region IX START

El Dorado Hills Naturally Occurring Asbestos Project

Soil Analysis by PLM and TEM

PAN: 001275.0440.01TA
TDD Num -04-0-0011

1.0 GENERAL

Ecology and Environment, Inc., (E & E), with a business office located at 350 Sansome Street, Suite 300, San Francisco, California 94104, has entered into a contract (Contract No. 68-W-01-012) with the U.S. Environmental Protection Agency (US EPA) to procure as needed various analytical services.

The US EPA has directed E & E to collect, prepare and analyze soil samples. Surface soil samples will be collected at various locations which may contains naturally occurring asbestos. The sampling is expected to begin in October 2004. The majority of the sampling will be completed over a 10 day period. E & E will collect approximately 230 surface soil samples.

2.0 ANALYTICAL REQUIREMENT

2.1 PURPOSE OF ANALYSIS

E & E will collect and prepare230 surface soil samples and submit the samples for analysis . The specific analysis parameters required are indicated in sections 2.2, 2.3, 2.4, 3.0 and 4.0. The data will be used by the US EPA to assist them in their risk assessment and decision making process.

2.2 SPECIFIC PROJECT REQUIREMENTS

All laboratory services will be provided by the E & E contracted laboratory with no sub-contracting of analyses allowed. Air samples will be initially analyzed for asbestos fibers following NIOSH 9002, *Asbestos by Polarized Light Microscopy*. If asbestos is not detected

sample at a concentration of greater or equal to 1 percent by area following NIOSH 9002, then the sample will be further analyzed by Transmission Electron Microscopy following *EPA 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials Method*.

Specific project requirements and specifications for the method are listed in Table 2-1, Table 2-2 and Table 2-3. Other required specification are described in sections 3 through 5 of this SOW

To insure quality for the analytical project the following measures are required:

- All analyses will be conducted by a NVLAP-certified laboratory for the analysis of asbestos fibers.
- The laboratory must provide documentation of successful proficiency in detection of "Libby amphibole" asbestos.
- The laboratory must conduct zone axis patterns measurement and quantitative EDS chemistries for identification.
- The laboratory have previous experience in the determination of chrysotile, regulated amphibole asbestos fibers in soil by the specified NIOSH and EPA methodologies.
- The laboratory have previous experience in the determination and reporting of non-regulated amphibole by PLM and TEM.
- The laboratory will have previous experience with providing detailed analytical documentation of analysis to support US EPA projects.
- Analytical precision will be documented with duplicate and replicate analyses.
- The laboratory must willing and able to provide technical assistance to START project management regarding analysis prior to and after generation of data.

2.3 TURNAROUND TIME

Sample data turnaround for PLM data is 5 days from the validated time of sample receipt (VTSR) of the last sample in each sample delivery group (SDG). Sample data turnaround time for TEM data is an addition 5 days for at total of 10 days from the validated time of sample receipt (VTSR) of the last sample in each sample delivery group (SDG). The report turnaround requirements for samples is specified in Table 2-2 Turnaround times for Data packages and Electronic data deliverables, which is required for all analyses, is also specified in Table 2-2.

2.4 ANALYTICAL PROTOCOL REQUIRED

Samples for PLM analysis are to be analyzed, documented, and reported as specified in the NIOSH 9002 and this SOW. Samples for TEM analysis are to be analyzed, documented, and reported as specified in the *EPA 600/R-93/116* method and this SOW. Any modifications to these protocols should be specified and approved prior to acceptance of project. Protocol, procedures and parameters not discussed in the method or specified in this SOW should be addressed in the laboratory Standard Operating Procedure (SOP) for PLM analysis NIOSH 9002 and by TEM analysis by *EPA 600/R-93/116*.

Table 2-1 Summary of Samples to be Collected		
Method:	NIOSH 9002, *Asbestos by Polarized Light Microscopy*	*EPA 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials Method.*
Sample Container:	Prepared sample mass ranging from 1 00 grams to 1,000 grams in poly bag.	
	Number of Samples	**Number of Samples**
	230 samples	< 230 samples
Frequency will be 20 to 50 samples generated each day for several weeks.		

Table 2-2
Analytical Requirements
for El Dorado Hills Naturally Occurring Asbestos

Each samples will be dried, milled, sieved and packaged in a seal bag with custody documentation.

Sample collection dates: September 2004 **Sample delivery date: September 2004**

Method	Specification	Turnaround Times
NIOSH 9002, *Asbestos by Polarized Light Microscopy*	-Detection Limit: 1 % -Screening level: 1 %	**Final Data Report:** **Samples**: Within 5 working days of receipt. **Data Package and Electronic Data Deliverable:** **All Samples:** Within 10 working days of final report.
EPA 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials Method.	-Preparation and analysis of samples that have PLM concentration less than 1%. -Detection Limit: 0.0025% by weight -Aspect Ratio: All asbestos structures with an aspect ratio greater than or equal to 3:1 will be counted irrespective of length. -Identification of fibers.	**Final Data Report:** **Samples:** Within 10 working days of receipt. **Data Package and Electronic Data Deliverable:** **All Samples:** Within 10 working days of final report.

Table 2-3
For TEM Analysis only
Analytical Requirements per Each Sample
for El Dorado Hills Naturally Occurring Asbestos

Mineral Identification of Representative Structures

- Identification of asbestiforms shall include the following:

Regulated - tremolite, anthophyllite, actinolite, crocidolite, amosite and chrysotile
Other amphibole asbestiforms - winchite, richterite, ferro-edenite , magnesio-arfvedsonite**,** and magnesio-reibeckite
Non-Asbestos Material- all other mineralogy

Structure Classification for Each Structure

Dimensions for Each Structure

Counting
(All structures with aspect ratio of greater than or equal to 3:1)

Counted structure shall include the following:
Regulated - tremolite, anthophyllite, actinolite, crocidolite, amosite and chrysotile
Other amphibole asbestiforms - winchite, richterite, ferro-edenite , magnesio-arfvedsonite**,** and magnesio-reibeckite

Primary Structure Counts (Irrespective of Length).
Structure Counts (Irrespective of Length).
Structures with Lengths Greater than 5 Fm.
Fibers and Bundles with Lengths Greater than 5 Fm.
Number of PCM Equivalent Asbestos Structures Counted (PCM equivalent should include both regulated and other amphiboles).
Number of PCM Equivalent Asbestos Fibers Counted (PCM equivalent should include both regulated and other amphiboles).

Calculations

Counted structure shall include the following:
Regulated - tremolite, anthophyllite, actinolite, crocidolite, amosite and chrysotile
Other amphibole asbestiforms - winchite, richterite, ferro-edenite , magnesio-arfvedsonite**,** and magnesio-reibeckite

Asbestos Structures Per Square Millimeter
95 % Confidence Interval for Each Reported Concentration

Parameters

Analytical Sensitivity
Grids Opened
Area of Filter Analyzed
Total Filter Area

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Method-specific quality assurance/quality control (QA/QC) requirements specified in the PLM and TEM methods are to be followed with the following specifications.

The following replicate and duplicate analyses are required for all samples analyzed by TEM:

Replicate Analysis:	New grids counted by same analyst:	% 5
Replicate Analysis:	New preparation by same analyst:	% 5
Duplicate Analysis:	Same grids recounted by different analyst:	% 5
Duplicate Analysis:	New grid counted by different analyst:	% 5
Duplicate Analysis:	New preparation by different analyst:	% 5

Other QA/QC requirements should include analysis of a laboratory control standard, process blanks and field blank with each group of samples. A determination of a blind internal laboratory control sample by the analyst during the analysis phase of this project is recommended. However, if this is not practical, documentation of the primary analyst performance results from the most recent quarterly inter-laboratory performance verification may be substituted in lieu of a laboratory control sample. The quality assurance limits used to evaluate the QA/QC samples must be indicated with quality assurance data reporting.

The laboratory is expected to adhere to standard laboratory practices when analyzing samples and documenting results. Questions concerning specific sample analyses should be addressed prior to analysis of samples. If the laboratory has any questions or problems concerning the analysis of received samples, E & E should be notified immediately by phone, followed by a letter in hard copy that discusses the problem(s) and associated resolution(s). All correspondence between the laboratory and E & E should be documented in the data package. **If established QC limits are exceeded, appropriate actions must be taken to correct or address the problem. Re-analysis of the affected samples is required for all non-matrix related problems.**

4.0 DELIVERABLES REQUIREMENTS

Samples analyzed by the laboratory for this project will require the following deliverables:

- Final data report,
- Complete data package, and
- Electronic data deliverable.

An analytical project is not complete until all deliverable requirements have been met.

4.1 FINAL DATA REPORT

The final data report may be reported either in a summary table or on individual sample sheets. Reports must be signed and should either be hard copies sent by mail or image files sent by e-mail or mail. The data should be clearly identified as being final. All QC summary information must be included.

The following data is required in the final report:

Narrative on conditions of sample, method, counting rule, and summary of any quality assurance or quality control problems encountered during analysis.

For each PLM sample and all PLM QC samples include client sample name, laboratory identification number, appearance, % fiberous non-asbestos, % non-fiberous non-asbestos, % chrysotile asbestos, % amphibole asbestos, analytical sensitivity, analyst, and analysis date.

For each TEM sample and all TEM QC samples, include client sample name, laboratory identification number, analytical sensitivity, grids opened, filter area, area analyzed, analyst, and analysis date.

For each regulated asbestiform include the following: structures per cc, structure counts > than 5 Fm, asbestos fiber and bundle counts > 5 Fm, 95 % confidence interval.

For each other amphibole asbestiforms include the following: structures per cc, structure counts > than 5 Fm, asbestos fiber and bundle counts > 5 Fm, 95 % confidence interval.

For each sample and all QC samples, include the TEM Asbestos Fiber Count-Raw data information table. This table should include for each grid, the grid number, grid coordinates, primary and total structures, lengths, width, structure type, and asbestos type.

4.2 COMPLETE PROJECT DATA PACKAGE

The final data package may be reported either as a compilation of printed data or as a compact disk-read only memory (CD-ROM) with image files that are a facsimile of the printed data package. The image file should be in portable document format (pdf).

The data package shall include all copies of the original documentation generated in support of a method performed under the contracted Statement of Work. The data packages will be used to demonstrate and document that all requirements of the method have been met. The data packages will be used to support US EPA decisions and cost recovery efforts. Data and data packages may be used to support US EPA civil enforcement activities. The documentation includes, but is not limited to, sample tags, custody records, shipping information, standard preparation records, sample preparation/extraction records, and sample analysis record including printouts and copies of log pages or copies of log sheets. The laboratory must maintain all original information and

documentation required in the data package for five years. All related method records in permanently bound notebooks and all related computer files must also be maintained for five years. Otherwise, the laboratory must provide original documents and files in the data package rather than copies.

The following deliverables are required in the data package. The following data requirements are included to specify and emphasize general documentation requirements and are not intended to supercede or change the requirements of each method.

C Raw data (to support all summary data) should include the following:
1. Copies of all analysis preparation sheets.
2. Copies of all analyst count sheets.
3 Copies of all information necessary to calculate data reported in the final data report.

C Pages within the final data report and data validation package will be numbered sequentially.

C A copy of the laboratory's certification for TEM analysis must be included with data validation pac

4.3 ELECTRON

The structure of the EDD must conform to the structure indicated in Attachment E1. Field names must match precisely the field names listed.

DO NOT include results for any other quality control samples.

The laboratory must perform a QC check on the electronic data versus the final data summary report prior to submission of the electronic data.

The EDD may be a Microsoft Access data table, a tab-delimited or fixed field width ASCII file, or a Microsoft Excel or Lotus 1-2-3 spreadsheet. Comma-delimited ASCII files will not be accepted. The EDD may be delivered on a three and half inch diskette, CD-ROM as a e-mailed attachment.

5.0 ADDITIONAL REQUIREMENTS

All samples and prepared materials related to the samples must be held for six months. Prior to disposal of any sample, E & E must be notified and may require that the samples be returned to E & E, at E & E cost.

Disposal of samples and sample containers must be in compliance with local, state, and federal regulations and will be the responsibility of the laboratory. **Disposal cost must be included in the price of analysis**.

The data package will be independently validated within two months of package receipt. The

laboratory will likely be contacted during the validation process to clarify any discrepancies or problems. The laboratory will perform corrective action as required. **All post sampling costs related to validation and corrective actions must be included in the price of analysis**.

All hard and electronic data generated in relation to E & E projects must be archived for five years.

Audits may be performed by E & E or the US EPA Quality Assurance Office. Performance Evaluation samples may be submitted to the laboratory at any time.

All work must be performed by the contract specified laboratories.

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