SAMPLING AND ANALYSIS PLAN
FOR
ASBESTOS AIR SAMPLING
CLEAR CREEK MANAGEMENT AREA
SAN BENITO COUNTY, CALIFORNIA
(U.S. Department of the Interior,
Bureau of Land Management, Hollister, California)

EPA CONTRACT NO. 68-W-98-225
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CH2M HILL PROJECT NO. 175843

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1.1 Project Organization

This work assignment issued under Environmental Protection Agency (EPA) Response Action Contract (RAC) has a Site Manager (SM) who works directly with the EPA Work Assignment Manager (WAM) to accomplish the work assignment. The SM will manage the financial, schedule, and technical status of the work assignment. The key people involved in interfacing with the SM are the WAM, Quality Assurance Officer (QAO), Senior Reviewer (SR), and the Field Team Leader (FTL).

Field support personnel will be responsible for the on-site collection of all air monitoring samples, field notes, associated chain of custody (COC) tasks, and sample shipment to the analytical laboratory. Study participants will perform specific activities as presented in Section 2.1, while wearing air monitoring equipment.

EPA selected the team members for this project including personnel from EPA (Work Assignment Manager, Air Quality Specialist, Toxicologist), BLM (Geologist), and CH2M HILL (Project Manager, Environmental Toxicologist/Human Health Risk Assessor, and other professional staff).

The primary responsibility for this project rests with the SM, and independent quality control is provided by the SR and QAO. The SR and QAO review project planning documents, data evaluation, and all deliverables.

The sampling team will implement the Sampling and Analysis Plan (SAP). The SM will utilize technical staff with expertise in project controls and contract management to ensure conformance with financial and contract requirements, respectively.

Should quality control issues arise, the SM, WAM, and QAO will identify appropriate corrective action to be initiated by the FTL or the laboratory, as appropriate.

The data recipient is the EPA. The EPA will coordinate the release of the data to the data users, presumably risk assessors and appropriate federal, state and local regulatory agencies. EPA will release the data to the public with the results from the risk assessment, after one is conducted.

1.2 Problem Definition/Background

The Clear Creek Management Area (CCMA) is located in San Benito and Fresno Counties, California and is within an area that contains large amounts of naturally occurring asbestos. It is one of four geographically distinct areas of the Atlas Asbestos Mine Superfund Site. It is managed by the U.S. Department of the Interior, Bureau of Land Management (BLM),

Hollister, California. The naturally barren slopes, bald ridges, network of bulldozed mining trails, and isolated location make the CCMA a popular and challenging location for recreational use by off-road motorcyclists, including many families with children, who camp in the area (Popendorf and Wenk, 1983). The area is also used by rock collectors, hikers, campers and hunters (BLM, 2003).

1.2.1 Problem Definition

Since the late 1970s the BLM has conducted studies to identify and quantify the dust exposures of recreational users and rangers with the CCMA (Popendorf and Wenk, 1983). The "Human Health Risk Assessment for the Clear Creek Management Area" was developed for the BLM by PTI Environmental Services (1992) to assess the potential hazards and risks posed to public health associated with the inhalation of airborne asbestos generated during off-road vehicle use, as well as other site uses that generate less dust. This current task responds to EPA's request to update the 1992 Human Health Risk Assessment (HHRA) by:

- Including children as receptors, and
- Using current state-of-the-science Transmission Electron Microscopy (TEM) to identify and quantify asbestos.

1.2.2 Purpose

The purpose of this task is to prepare a Sampling and Analysis Plan (SAP) for the collection of asbestos fibers from personal breathing space air samples, using standard asbestos sampling techniques (using a calibrated air pump attached to a plastic cassette, which contains an asbestos fiber sampling filter). The collected samples will be sent to an analytical laboratory and analyzed for asbestos type and concentrations in air by TEM. A limited number of ambient air samples will be collected concurrently and will also be analyzed for asbestos concentrations in air. The personal breathing space air samples will be collected such that they reflect typical visitor recreational activities and work activities performed by BLM personnel. The results of the air sampling program will be used to support a subsequent human health risk assessment.

This SAP presents site history, problem statement, data needs and uses, data quality objectives, sampling rationale, analyses to be performed, procedures for field activities, and data validation. General field and laboratory activities described in this SAP include:

- Collection of asbestos fibers from personal breathing space air samples (plus a limited number of ambient air samples).
- Laboratory Analysis by TEM of the collected samples containing asbestos fibers.

This SAP will serve as the Field Sampling Plan, as well.

1.2.3 Physical Setting

The CCMA consists of approximately 75,000 acres of public land. Within the CCMA boundary is the Serpentine Area of Critical Environmental Concern (ACEC), which is approximately 30,000 acres of land with soils that have elevated levels of naturally occurring

(unprocessed) asbestos. The ACEC, the site of this study, has over 86 abandoned mines and mining disturbances (mercury, chromium, gemstone, asbestos) , as well as hundredsof miles of mining routes. Chapparal is the predominant vegetation within the ACEC, though many areas of devoid of vegetation due to nutrient-poor soils and landslides. The San Benito Mountain Research Natural Area, located within the ACEC, was established to protect native plant populations that are, in many cases, endemic to serpentine soils.

1.2.4 Background

Because of the concerns about the on-site naturally occurring asbestos, CCMA visitor pamphlets advise potential visitors to avoid the CCMA if the weather is hot, dry, and dusty. The evaluation of potential human health impacts from the on-site inhalation exposure to airborne asbestos of recreational users at CCMA is the purpose of this work.

Inhalation of asbestos fibers has been linked to several adverse health effects. These include fibrosis of the lung (asbestosis), benign pleural plaques and thickening, lung cancer, and mesothelioma, which is a cancer of the thin membrane that surrounds the lungs and other internal organs (EPA, October 2002).

There are six minerals whose fibrous forms are characterized as asbestos and that are currently regulated. The six regulated asbestos fibers include one from the serpentine family of minerals: chrysotile, and five from the amphibole family: fibrous reibeckite (crocidolite), fibrous grunerite (amosite), actinolite asbestos, anthophylite asbestos, and tremolite asbestos. There are unregulated amphiboles, winchite and richterite, for which toxicity data is not currently available. According to Dr. Aparna Koppikar of EPA, it is probably prudent to consider potency of unregulated amphiboles, especially those with similar durability and dimension to regulated amphiboles, as having similar pathogenicity (EPA, September 2003a).

Definitions of fibrous structures differ depending on the regulatory entity. For example, fibrous structures are defined by the Occupational Safety and Health Administration (OSHA) as particles exhibiting a length of greater than 5 μm and aspect ratio of length to width of 3 to 1. In comparison, the U.S. EPA school asbestos clearance regulations under the Asbestos Hazard Emergency Response Act (AHERA) specify an aspect ratio of 5 to 1.

The two major analytical techniques used to analyze air samples for asbestos are phase contrast light microscopy (PCM) and transmission electron microscopy (TEM). PCM, the historical technique for asbestos analysis, is cheaper, but is unable to distinguish between asbestos and nonasbestos fibers. In addition, PCM analysis cannot detect fibrous structures with diameters less than 0.3 μm, because of its limited range of magnification, which is 100 to 400 times. PCM cannot resolve internal structure or distinguish the mineralogy of a structure. PCM results are reported on a mass-per-volume basis, fiber per cubic centimeter (f/cc or f/cm^3), or fiber per milliliter (f/mL).

TEM is more expensive to perform than PCM, but it can detect fibrous structures with diameters less than 0.01 μm , as its magnification range is 5,000 to 20,000 times. TEM can resolve internal structure and distinguish mineralogy. TEM results can be reported as

concentrations in terms of structures per cubic centimeter (S/cc) or for comparison with EPA AHERA standards, as structures per square millimeter of filter in the air monitor used.

Especially for environmental samples, analytical results using TEM and PCM vary primarily due the inability of PCM to distinguish asbestos and non-asbestos structures. PCM and TEM results also do not correlate well because of differences in the size of fibers counted, differences in the ability to distinguish mineralogy, and differences in counting methods.

The reporting of TEM results as S/cc does not yield a measurement equivalent to PCM data expressed as f/cc, because fibers are different than structures. However, much of the historic asbestos research, health effects data on asbestos, and regulatory guidance is expressed in terms of PCM f/cc. A useful TEM analysis technique is to sort the data to create a category of structures that would be expected to be visible under PCM and meet PCM criteria for counting as fibers. In this case, structures meeting a minimum diameter of greater than 0.3 μm with a length greater than 5 μm are counted as PCM equivalent (PCMe) fibers (EPA, October 2002).

1.2.5 Site History

Although primarily a recreation area now, the 50,000-acre CCMA has had a long history of human use. Native Americans were the first to inhabit the Clear Creek area. Beginning in the mid- to late-1800s the area was extensively mined for mercury ore; the largest mercury mine operated until the early 1970s. Modern day CCMA is an example of a multiple use recreational area visited by people interested in a variety of recreational activities.

1.2.5.1 Site Description and Activities

The naturally barren slopes, bald ridges, network of bulldozed mining trails, and isolated location makes the CCMA a popular and challenging location for recreational use by OHV (off-highway vehicle) enthusiasts, rock collectors, hikers, campers, and hunters. Seven barren hills are open to hill climbing and open off-highway vehicle play (BLM, 2003).

1.2.6 Data Needs and Uses

Data needs and uses for the data to achieve the objectives described in this section have been identified through the data quality objective (DQO) process presented in Appendix A. As described above, airborne asbestos fibers will be collected from the breathing zone of recreational visitors and BLM workers at the CCMA for use in an updated human health risk assessment.

1.3 Project Description and Schedule

All project related airborne asbestos sampling will occur at the Clear Creek Management Area.

1.3.1 Sampling Location Selection

Sampling locations will be selected in conjunction with BLM personnel.

During a site visit to CCMA, organized by EPA and hosted by BLM (May 2004), OHV Staging Area #4, located about 3 miles east of the Oak Flat Campground on improved, unpaved road #ROO1 on the western side of the CCMA, was identified as a good candidate location for the base of operations for the CCMA asbestos air sampling.

It is a location where on-site camping occurs and can serve as a departure point for motorcycle and hiker scenario sampling sessions. The dirt road leading from the CCMA western boundary to OHV Staging Area #4 can serve for asbestos sample collection in the 4-wheel drive OHV. BLM maintenance personnel arriving for the work day from Hollister would enter the CCMA through the west entrance. Additionally, the BLM decontamination facility for vehicles and personnel is located near the west entrance.

1.3.2 Schedule

Asbestos sample collection activities are planned for late 2004, probably early November. The schedule is based on the weather and the availability of participants for sample collection. It is assumed that sampling activities will occur within 2-3 days of a single week. It is anticipated that laboratory analysis will be completed within three months of sample collection (i.e. early 2005) and data validation will be completed within four to six weeks of delivery of the completed electronic data packages.

Additional sampling events may be scheduled in order to investigate variability in asbestos exposure levels associated with weather and weather-related parameters, such as soil moisture.

1.4 Data Quality Objectives

The purpose of the asbestos fiber air sampling is to produce data that are, as reasonably possible, an accurate representation of the levels of airborne asbestos fibers to which recreational users are exposed during site visits and to which BLM personnel are exposed during work activities. These data may be used for a variety of purposes, including the development of an updated health risk assessment and the evaluation of the adequacy of current measures by the BLM to protect the public from excessive asbestos exposures.

1.4.1 Project Quality Objectives

Specific data quality objectives were considered independently through the DQO process (EPA, 1998) to meet the data users' needs for each activity. Appendix A presents the DQO decision-making process for the sampling and analysis, and field activities. The sampling and analyses are designed to provide current data for public health purposes.

1.4.2 Measurement Performance Criteria

The quality assurance (QA) objective of this plan is to define procedures that will provide data of known and appropriate quality for the needs identified based on the DQO process. The applicable quality control (QC) procedures, quantitative target limits, and level of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical methods.

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For asbestos analysis, data quality objectives (precision, accuracy, completeness) are studied using:

- Replicates
- Duplicates

Precision = percent difference (of replicates or duplicates). Average = true value.
Accuracy = values are within the 95% UCL of average of 2 (Poisson and Gaussian influenced).

Reporting limits for laboratory data are based on project needs and applicable regulatory requirements. Practicable detection limits will be identified subsequent to selection of a laboratory. The laboratory specific method detection levels will be used for the project decisions. Analytical methodology is described in Section 2.

1.5 Special Training and/or Certification

Field personnel shall adhere to the procedures specified in the SAP. In addition, a site-specific health and safety plan (HSP) will be developed and adhered to by field personnel. A copy of the HSP is found in Appendix F of this document. The SSC is responsible for ensuring that field collection personnel have current health and safety training prior to commencement of field sample collection activities. Field collection personnel will be properly trained prior to sampling activities. Study personnel will be provided written scripts describing the activity scenarios (Section 2.2, Appendix B).

Field personnel performing sample collection and preparation activities will be properly trained in procedures necessary for each task. Internal processes/procedures for establishing that personnel are adequately experienced in the duties they are expected to carry out will be followed.

Personnel who are responsible for performing laboratory analyses will be properly trained to conduct the laboratory analyses described in this SAP. The laboratory will have sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned functions. Data verification and validation will be under the direction of the QA Officer who is experienced with the production, reporting, verification and validation of analytical data.

1.6 Documentation and Records

Field documentation and records will be as described in Section 2. Laboratory documentation will be per: (1) methods and quality assurance protocols listed in Section 2 and (2) laboratory-specific standard operating procedures. Overall project documentation will be per EPA's Region 9 RAC program plan.

2.0 Measurement Data Acquisition

The actual number of airborne asbestos fiber samples collected will be dependent on sampling design (co-located samples), QA requirements (blanks, etc.), and also the air sample size that can be collected without clogging the asbestos fiber collection filter with ambient dust. Therefore, the actual number of samples to be collected and analyzed for the asbestos monitoring will be determined during the execution of this SAP.

2.1 Asbestos Air Sampling Plan

On-site air sampling during recreational activities will be conducted using established standard methodology (described below). The goal of the sampling at the CCMA is to collect asbestos fiber samples which will be representative of asbestos fiber exposures experienced by typical recreational visitors and BLM workers at the CCMA. The results of the sampling program will be used to support a subsequent human health risk assessment. Receptors and exposure activities to be sampled at the CCMA will include the following:

- Adult and child users of the CCMA (Note that child exposures will be measured by positioning air sampling cassettes on adult riders at a child's height):
  - Off-road motorcycle riders (leaders and followers)
  - 4-Wheel Drive OHV (Off Highway Vehicle) riders along CCMA improved dirt roads (with vehicle windows open)
  - ATV (All Terrain Vehicle) riders along CCMA unimproved dirt roads
  - CCMA hikers and campers.
- Adult workers performing:
  - Maintenance with heavy equipment
  - Maintenance with hand tools.
- Adult workers performing decontamination of soiled vehicles:
  - Washing with water hose
  - Washing with pressure sprayer
  - Vacuuming with HEPA filter
  - Vacuuming without HEPA filter.
- Ambient air samples.

Brief proposed Activity Scenario Scripts for these activities are presented in Appendix B. The activity scripts describe the air monitoring scenarios, including how many participants will perform each event, which participants will wear personal air samplers, how many samples are proposed to be collected per participant, and the rationale for each event. Table 1 entitled "Proposed Number of Air Samples" presents, for each activity, the proposed number of events, the number of samples per event, and the total number of analyzed samples per event.

During all motorcycling sampling activities, the recreational motorcyclists will wear protective equipment including helmets, filter masks to minimize respired fibers and dust (similar to RESPRO brand "Sportsta Mask and Sportsta Filter", a Hepa-Type sub-micron filter), and overall "jump-suits" similar to those used by BLM personnel at CCMA. All appropriate personal protective equipment (PPE) requirements will be included in the site-specific HSP (Appendix G).

2.2 Sample Collection Methodology

On-site air sampling during recreational activities will be conducted using established standard methodology. Written scripts which describe the activity scenarios are presented in Appendix B.

The US EPA Region 8, Standard Operating Procedure (SOP) for the Sampling of Asbestos Fibers in Air (SOP EPA-Libby-01, Revision #1, March 2001) will be consulted and used as a standardized method for sampling air to measure the concentration of asbestos fibers. A copy of this SOP is presented in Appendix C. This SOP is applicable to any type of asbestos fiber (chrysotile, amphibole) that may exist in air (indoor or outdoor) and is applicable to both personal and ambient air sampling techniques. Filters collected in this way are suitable for examination by a variety of microscopic techniques.

The air samples will be collected under conditions which, it is assumed, will be very dusty. In order to minimize interference of sample collection by airborne dust clogging the filters, the recommended filter for TEM analysis with a pore size of 0.45 µm is being replaced with a phase contrast microscope (PCM) filter with pore size of 0.8 µm. Previous asbestos investigations have indicated that available filter cassettes (and cowls) with these filters will be adequate for collecting the asbestos fibers under dusty conditions (BLM, 2004; E&E, 2004).

The sampling design requires a sample pump that is capable of maintaining a constant flow of 2 to 3 liters/minute (±10%) through a 0.8 µm filter under moderately dusty conditions without faulting (based on BLM historical experience at CCMA, and the U.S. EPA Region 8, Asbestos Air Sampling SOP). It must also be able to operate on one battery charge for at least 3 hours and for some up to 9 hours, or it must be able to operate on supplied electrical alternating current.

Air samples will be collected with personal or high flow sampling pumps equipped with cassettes (and cowl) that contain a 25 millimeter (mm) diameter mixed cellulose ester (MCE) filter with a pore size less than or equal to 0.8 micrometers (µm). Each sampler will be operated at approximately 2 to 3 liters per minute (lpm). Samplers will be calibrated, using an electronic calibrator, prior to and after use each day using a cassette reserved for calibration (from the same lot of the sample cassettes to be used in the field). For pre-sampling calibration, calibration will be considered complete when $\pm$ 5 percent of the desired flow rate is attained, as determined by three measurements with the calibrator. For post-sampling, three separate constant flow calibration readings will be obtained and those flow readings will be averaged. If the flow rate changes by more than 5 percent during the sampling period, the average of the pre- and post-sampling rates will be used to calculate

the total sample volume. Samples for which there is more than a 25 percent difference from initial calibration to end calibration will be invalidated. The sample collector will record the pump serial number, sample number, initial flow rate, sample start/end times, sample locations, and final flow rate either in the field logbook or on a field data sheet (E&E, 2004).

The air sample volumes which will be collected will depend on the activity being monitored. Based on a preliminary air sample collection effort, conducted by US EPA at CCMA on September 15, 2004 (EPA 2004) activity-specific sample volumes will range as follows:

- Motorcycle Riding
  - Leader: 120 and 240 liters
  - Follower: 80 and 120 liters
- ATV Riding
  - Leader: 80 and 160 liters
  - Follower: 80 and 120 liters
- SUV Riding (Passenger)
  - Leader: 120 and 240 liters
  - Follower: 120 and 240 liters
- Camping
  - Awake: 120 and 240 liters
  - Sleeping: 960 liters
- Hiking: 120 and 240 liters
- BLM Maintenance Activity
  - Heavy: 80 and 160 liters
  - Light: 120 and 240 liters
- Vehicle Cleaning: 120 and 240 liters
- Ambient Air Sampling: 840 and 4200 liters.
  - Flow Rate. It is suggested that the pump be stopped and the flow rate measured every two hours (10–15 liters/minute).
  - Ambient Air Non-Detects. Approximately 4000 liters of ambient air will be collected from stationary samplers.

2.2.1 Management of Investigation-Derived Waste

The sampling activities are not anticipated to produce investigation-derived wastes (IDW). Personal protective equipment (PPE) consisting of personal particulate air filters, and general trash are the anticipated wastes from the proposed activities. Used PPE and other disposable equipment will be bagged and disposed in institutional dumpsters. No sampling and analysis of this PPE will occur.

2.3 Sample Documentation and Handling Requirements

Section 2.3 presents the various sample management procedures that will be followed during the performance of field activities, including procedures for sample labeling, sample documentation, and sample packaging and transportation.

2.3.1 Data Sheets and Log Books

Sampling data sheets will be used to record all sampling information. Information in the datasheets will include, at a minimum, the following:

- Location at the CCMA and activity being conducted during sample collection.
- Date and time of collection.
- Sample description including the name of the volunteer wearing the sampling equipment.
- Description of temperature and general weather conditions.
- The unique sample identification number for each air sample.

Data sheets will be completed, signed, and dated by the recorder. All logs will be written with waterproof ink. Corrections to data entered will be made by crossing out the error with a single horizontal line, initialing the correction, and entering the correct information. Crossed-out information shall be readable.

2.3.2 Photographs and Videotaping of Air Sampling Activities

Photographs will be taken during selected air sampling activities. The photographs will be used to provide backup documentation of compliance with SAP. The camera will be equipped with a device to record the date and time on the photograph, if possible. A log of the photographs will be recorded and include the sampling activity and approximate location for each photograph.

Videotape records of selected air sampling activities will also be conducted to record events such as the generation of dust plumes generated by passing motorcycles, 4-wheel drive OHVs, and ATVs. This information may help to visually assess the magnitude and duration of the generated plumes.

2.3.3 Sample Labeling

Each sample will be identified with an adhesive label bearing a unique sample identification number.

2.3.4 Chain of Custody Records

Chain of custody procedures will be used to maintain and document sample collection and possession. During the sampling process, an EPA Region 9 Chain-of-Custody Record form will be completed. The completed Chain-of-Custody Record will accompany all samples

and be signed as required as each sample package recipient receives and relinquishes possession of the sample package.

2.3.5 Sample Packaging and Shipment

The air sample filter cassettes will be carefully packaged and shipped to the analytical laboratory using standard methodology. Plastic coolers will be used for sample shipment for convenience.

2.3.5.1 Preparation of Sample Coolers

1. Remove all previous labels on the cooler.
2. Seal all drain plugs with tape (inside and outside).

2.3.5.2 Packing Samples in Coolers

Each sample will be placed in an individual plastic bag.

2.3.5.3 Closing and Shipping of Cooler

Sample documentation will be enclosed in sealed plastic bags taped to the underside of the cooler lid. Coolers will be secured with packing tape and custody seals as described below.

1. Tape the cooler lid with strapping tape, encircling the cooler several times.
2. Place chain of custody seals on two sides of the lid (one in front and one on the side).
3. Place "This Side Up" arrows on the sides of the cooler.

The coolers will then be shipped to the laboratory by overnight courier the day after a sample collection site visit is completed (daily shipments are not required since the samples are not temperature sensitive and since the CCMA is in a remote location far from overnight delivery service facilities).

2.4 Analytical Methods

Using established TEM methodology, laboratory analysis using TEM will identify and determine asbestos fiber concentrations. Several different types of asbestos fiber counting measurements can be considered for selection by EPA as part of the TEM analysis for the asbestos fiber air samples.

Fibers are also identified as to type of asbestos. CCMA asbestos sampling conducted by BLM (2003) to date has detected chrysotile fibers with a very minor amount of amphibole fibers in isolated samples.

2.4.1 Analytical Laboratory

Samples will be analyzed by an analytical laboratory selected from the list of asbestos analytical laboratories that are part of EPA's voluntary asbestos laboratory program, which means they have been audited and have successfully analyzed a PE (performance evaluation) sample. This effort will be coordinated between the EPA WAM, the SM, and the Contracts Coordinator at EPA. The analytical laboratory will be pre-qualified by EPA.

2.4.2 Analytical Methodology

This section provides the laboratory procedures to be followed for preparation and asbestos analysis of the collected air particulate samples. Considerations for sample preparation , sample handling, analytical methods, and data validation are included.

Laboratory analysis using TEM will identify and determine asbestos fiber concentrations using TEM methodology based on International Organization for Standardization (ISO), International Standard, ISO 10312 (1995(E)), Ambient Air – Determination of Asbestos Fibers – direct-transfer TEM Methodology (Appendix D).

The proposed laboratory for this study has been identified by U.S. EPA Region 9 as Lab/Cor, Inc. (Seattle, Washington). An example Asbestos Analysis Test Report and an Electronic Data Deliverable (EDD) from Lab/Cor, Inc. is presented in Appendix E.

The following asbestos fiber and mineral identification criteria will be determined for each of the collected samples:

- Asbestos fibers and complex structures:
  - Fibers between 0.5 μm (micrometers) and 5 μm in length
  - Fibers and Structures greater than 5 μm in length
  - PCM equivalent fibers and structures (greater than 5 μm in length with a 3:1 aspect ratio)
  - Fibers and structures greater than 0.5 μm in length with a 5:1 aspect ratio.
- Asbestos fiber mineral identification procedures (e.g. chrysotile, asbestiform amphibole, and other "regulated" asbestiform minerals; as well as any other asbestiform fibers identified during TEM analysis including unregulated fibers (e.g. wincherite and richerite), cleavage fragments, and transition fibers:
  - Energy Dispersive X-ray Analysis
  - Electron Diffraction.

Cleavage Fragments. ISO 10312 does not distinguish cleavage fragments. Cleavage fragments are not part of TEM analysis. Cleavage fragments are based on EPA bulk method: 15:1 aspect ratio. Fibers >5 μm, <10-15 to 1 aspect ratio.

Transitional Fibers. Transitional fibers are counted as non-asbestos. If >90% one type = that type of fibers.

The required TEM Analytical Sensitivity (S/cc) and Limit of Detection (fibers/cc) will be determined to meet the data quality needs of the subsequent human health risk assessment.

Analytical Sensitivity and Detection Limits. Analytical sensitivity is the smallest value that can be counted; the smallest number of fibers/cc that can be analyzed during an analysis (this is the value to which Berman structures are quantified) [CH2M HILL, 2004].

ISO Method report fibers as the 95% UCL of the mean for the sample. For the ISO Method the Detection Limit (DL) is < the 95% UCL of the mean. The DL is affected by contamination related variability and, if less than 30 fibers are counted, the Poisson distribution of fibers on the filter. The reportable concentration is related to the number of fibers counted as follows:

- Zero structures counted, reportable concentration = 3 * Analytical Sensitivity.
- One structures counted, reportable concentration = 4.7 * Analytical Sensitivity.
- Two structures counted, reportable concentration = 6.9 * Analytical Sensitivity, etc.

Several variables will factor into the achievement of a DL of 0.004 f/cc (as an example):

- 50 liter sample, 133 grid opening will need to be counted
- 400 liter sample, 13 grid openings will need to be counted

During teleconferences with EPA and BLM (March 2004) the following analytical sensitivities for TEM asbestos concentration analysis have been discussed for CCMA:

- 0.004 S/cc for activity related sampling and
- 0.0005 S/cc for ambient air sampling.

Additionally, based on the exposure assumptions and the results of the Human Health Risk Assessment for the CCMA (PTI, 1992), the required limit of detection (asbestos concentration in fibers per cubic centimeter) was estimated (95-percent upper confidence limit on the average concentration). These limits of detection (PCM equivalent fibers) will permit a cancer risk of 1E-06, to be calculated:

- Off highway vehicle riding scenario: 0.017 f/cc. For the off highway riding scenario, the CCMA measured asbestos air concentration of 0.066 f/cc (95-percent upper confidence limit on the average concentration) was equivalent to an excess cancer risk of 4E-06 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.017 f/cc for an excess cancer risk of 1E-06.
- Other activities scenario: 0.004 f/cc. For the other activities scenario, the CCMA measured asbestos air concentration of 0.04 f/cc (95-percent upper confidence limit on the average concentration) was equivalent to an excess cancer risk of 1E-05 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.004 f/cc for an excess cancer risk of 1E-06.

2.5 Quality Control

A field quality control (QC) program is implemented to assure conformance with data quality protocols established by the EPA. The field QC program is normally comprised of additional collected field QC samples, including co-located samples and equipment blanks.

ISO 10312 Required QA/QC Samples (ISO 10312, 1995 Version is used by Lab/Cor).
ISO 10312 Methodology requires that 25% of analyses be QA/QC samples. The results for the QA/QC samples must be within the 95% UCL of the mean for the samples (e.g. within the 5% confidence interval).

- 5% Replicates: same analyst, same grid openings
- 5% Replicates: same analyst, different preparation (same sample)
- 5% Duplicates: different analyst, same grid openings
- 5% Duplicates: different analyst, different grid openings
- 5% Duplicates: different analyst, re-preparation of sample.

Laboratory Process Blank. An un-opened laboratory filter is analyzed; 1 per 10 samples (e.g. 1 per 5 samples ; 2 per 15 samples.

Stopping Rules. ISO 10312 stopping rules will be followed. Counting will be stopped at the required analytical sensitivity after between 4 and 150 grid openings have been counted.

2.5.1 Performance Evaluation Samples

Performance Evaluation (PE) sample cassettes which have a known concentration of asbestos fibers will be supplied by U.S. EPA and transmitted to the laboratory for analysis. Depending on the QA protocol, one or more asbestos PE samples will be included along with the samples collected, as a further QA check.

Currently Lab/Cor, Inc. is evaluating three PE samples, which were submitted by U.S. EPA for analysis (October 18, 2004, Lab/Cor).

2.5.2 Co-located Samples

A co-located asbestos air sample is a second sample collected at the same location as the original sample. Co-located samples are collected simultaneously or at different times using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. Co-located samples are at a rate of 10% of the samples (U.S. EPA Region 10). Both co-located personal and ambient air samples can be collected:

- Samples collected using two pumps simultaneously (a measure of intra-event variability, a measure of collection variability); e.g. a second pump/filter attached to a participant
- Samples collected using two pumps in immediate succession (a measure of temporal variability).

2.5.3 Equipment Blank Samples

Equipment blank samples are collected on the sampling equipment that directly or indirectly contacts sample material. Equipment blanks are used to assess the effectiveness of equipment decontamination procedures and to evaluate the potential for cross-contamination between samples.

In the case of asbestos air samples, unused cassettes (filter blank) should be sent to the laboratory for analysis before field sampling is conducted. It is recommended that before the field study, 2 cassettes/100 cassette box will be analyzed by Lab/Cor (Lot Blank).

2.5.4 Laboratory Quality Control Samples

2.5.4.1 Duplicate Samples

Duplicate samples are collected to evaluate the reproducibility of sampling and analysis. Duplicate samples will be collected and treated in the same manner as other samples (E&E 2004). A separate number will be assigned to each duplicate, and all duplicates will be submitted blind to the laboratory. For this study duplicate sampling will be conducted through the collection of co-located samples.

Laboratory replicate and duplicate analysis can be performed by the laboratory to evaluate the reproducibility of the analysis:

- Replicate analysis: New grids counted by the same analyst
- Replicate analysis: New preparation by the same analyst
- Duplicate analysis: Same grids recounted by different analyst
- Duplicate analysis: New grids counted by different analyst
- Duplicate analysis: New preparation by different analyst.

An additional laboratory quality control analysis that can be performed are filter splits with a second laboratory that also meets the U.S. EPA qualification criteria.

2.5.4.2 Field Blanks

A field blank is a filter cassette that has been taken to the sampling site, opened, and then closed. Such a filter is analyzed to determine the background asbestos structure count for the measurement. One field blank is added to each daily batch (one un-opened cassette is added to batch).

2.6 Equipment Testing, Inspection, and Maintenance

2.6.1 Field Equipment

Field equipment and supplies will include, but are not limited to, the following:

- Air sampling pumps (personal and area pumps).
- Asbestos sample filter cassettes with filters.
- Air pump calibration equipment.
- Quart and Gallon size resealable bags.
- Sample coolers, packing material.
- Additional supply of health and safety equipment (i.e., air filter masks and filters, gloves, fresh drinking water, and first aid kit).

2.6.2 Laboratory Equipment

The primary goals of the project laboratory's preventative maintenance program will be to minimize the occurrence of instrument and equipment failure, and to minimize instrument down time when failure occurs. The laboratory will maintain a complete inventory of replacement parts needed for preventive maintenance and spare parts that routinely need replacement. Implementation and documentation of the preventative maintenance program will be performed in accordance with the policies prescribed in the Laboratory QAPP.

If an instrument fails, the problem will be diagnosed as quickly as possible, and either replacement parts will be ordered or a service call will be placed to the manufacturer. If instrument failure is expected to cause a delay in sample analysis, the CH2M HILL QAO will be notified promptly so that appropriate corrective action and sample capacity management can occur. All preventative maintenance, and maintenance performed as corrective action, will be documented by the group leader, analyst, or contracted service

representative who performed the procedure and the documentation will be maintained at the individual laboratory.

2.7 Instrument Calibration and Frequency

2.7.1 Field Calibration Procedures and Frequency

Instruments requiring calibration will be used in the field; therefore, field calibration procedures apply. Personal and area air sampling pumps, will need to be calibrated using air flow gauge(s) or a primary air flow standard. If air flow gauges are used in the field they will need to be calibrated using a primary air flow standard.

2.7.2 Laboratory Calibration Procedures and Frequency

Calibration of laboratory analytical instrumentation is required for the generation of appropriate data to meet project quality objectives. The laboratory will be responsible for proper calibration and maintenance of laboratory analytical equipment. Calibration activities performed will be documented in the analytical data package and will be available for review during internal and external laboratory audits.

2.8 Requirements for Supplies and Consumables

Supplies and consumables anticipated for use during the air sample collection include primarily sample containers (quart and gallon size resealable bags), bottled drinking water, and personal protection equipment. Consumables will be purchased in original packaging and stored in a manner that protects their usability. If long-term storage of consumables is necessary, the consumables will be inspected prior to their use to detect any damage or disintegration of the material. Records for purchases and receipt of supplies and consumables for sample collection and processing activities will be maintained by the FTL.

2.9 Data Acquisition Requirements (Nondirect Measurements)

The results and conclusions of the "Human Health Risk Assessment for the Clear Creek Management Area" developed for the BLM by PTI Environmental Services (1992) were used to estimate the limit of detection (PCM equivalent fibers) which will correspond to a cancer risk of 1E-06.

2.10 Data Management

Data management will involve the use of a computerized data management system. The system will provide a centralized, secure location for data of known quality. The data management system will include three main elements: the database, data management procedures, and personnel. These elements are briefly described in the following subsections.

2.10.1 Database

A spreadsheet will be created to store data collected as part of this effort. The software being used in support of the spreadsheet is Microsoft Access as the relational database.

2.10.2 Data Management Procedures

Data management procedures are a crucial part of the data management system. Established procedures are necessary to ensure consistency among data sets; internal database integrity; and a verified, usable data set. The tasks and procedures that will be performed for all project data prior to being entered into the database include:

- **Data mapping.** The process by which the collected environmental data are selected, marked, and correctly named for entry into the database.
- **Electronic data interchange**. To facilitate data interchange between the analytical laboratory and the data user, detailed specifications for the electronic data deliverable (EDD) will be communicated to the laboratory.
- **Data entry and verification**. The process by which data are correctly entered into the database, including data preparation, data import and entry, and data verification.
- **Data presentation and analysis**. Data from the database may be presented in appendix-style reports (tabular listings sorted by CCMA location, activity, and sample identification).
- **Data administration.** Effective administration of the data management system will reduce the likelihood of errors and ensure the integrity of the database. Data administration tasks include data redundancy control, operation and maintenance of the database, documentation of the data management process, and closing out the data management task in both interim and final stages of completion.

2.10.3 Personnel

Successful implementation of a data management system requires a clear definition of responsibilities. The project data coordinator and a database technician will carry out the data management system. The project data coordinator has an overall view of the project. Responsibilities include database integrity, redundancy control, data sharing and version control, performance, security, and backup. The database technician has a comprehensive understanding of the database structure, software, and associated analysis tools. Responsibilities include data logging and tracking, data preparation, data entry and verification, data archiving, data requests, and report generation.

3.0 Assessment/Oversight

3.1 Assessment and Response Actions

The SM, QAO, and Data Manager will monitor and audit the performance of the QA procedures. The QAO will conduct field audits if problems arise; currently, field audits are not scheduled. Audits may be scheduled to evaluate (1) the execution of sample identification, COC procedures, field notebooks, sampling procedures, and field measurements; (2) whether trained personnel staffed the sample event; (3) whether equipment was in proper working order; (4) availability of proper sampling equipment; (5) whether appropriate sample containers, sample preservatives, and techniques were used; (6) whether sample packaging and shipment were appropriate; and (7) whether QC samples were properly collected.

The laboratory may be audited, prior to the start of analyses, by a project chemist/QA officer not assigned to the laboratory. Performance evaluation samples provided by EPA may also be sent to the laboratory.

Audits will be followed up with an audit report prepared by the reviewer. The auditor will also debrief the laboratory or the field team at the end of the audit and request that the laboratory or field team comply with the corrective action request.

3.1.1 Reporting and Resolution of Issues

If QA/QC audits result in detection of unacceptable conditions or data, the SM will be responsible for developing and initiating corrective action. The WAM will be notified if nonconformance is of program significance or requires special expertise not normally available to the project team. In such cases, the WAM will decide whether any corrective action should be pursued. Corrective action may include:

- Reanalyzing samples
- Re-sampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting data acknowledging a level of uncertainty

3.2 Reports to Management

The SM and/or WAM may request that a QA report be made to the WAM on the performance of sample collection and data quality. The report will include:

- Assessment of measurement data quality
- Results of performance audits
- Results of systems audits
- Significant QA problems and recommended solutions

Monthly status reports to EPA will summarize overall project activities and any problems encountered. QA Reports generated on sample collection and data quality will focus on specific problems encountered and solutions implemented. Alternatively, in lieu of a separate QA Report, sampling and field measurement data quality information may be summarized and included in the final report.

The project objectives, activities performed for overall results, sampling, and field measurement data quality information will be summarized and included in the final report along with all QA reports.

4.0 Data Validation and Usability

The field, laboratory, and data management activities described in this SAP will be reviewed to assess whether these activities were performed in a manner that is appropriate for accomplishing the project objectives. Verification of the data is performed to determine whether the data have been generated in accordance with the procedures identified in this SAP. Data validation involves identifying the technical usability of the data for making decisions pertaining to satisfying the project objectives.

4.1 Validation and Verification Methods

Data for all parameters will undergo two levels of review and validation: (1) at the laboratory, and (2) outside the laboratory by an independent data review firm, to ensure the quality and usability of the data.

Initial data reduction, validation and reporting at the laboratory will be carried out as described in the laboratory standard operating procedures and laboratory QAPP.

Independent data validation outside the laboratory will follow EPA Contract Laboratory Program national Guidelines for Data Review (EPA, 1994; revised 1999 and 2002).

4.2 Reconciliation with User Requirements

The CH2M HILL QA Officer, in conjunction with the EPA WAM, will determine whether field and analytical data or data sets meet the requirements necessary for decision making. The results of measurements will be compared to the measurement performance criteria requirements set forth in this SAP. Results obtained from the project will be reconciled with the requirements specified in this SAP.

As data are evaluated, anomalies in the data or data gaps may become apparent to the data users. Data that do not meet the data users' needs will be identified and appropriately noted in the project database so the decision-makers are aware of its limitation.

5.0 References

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Table 1. Proposed Number of Air Samples

Activity	No. of Events	No. of Samples per Event	Total No. of Samples
Lead motorcycle riding, event = typical day	3 (on three separate days)	2 (20- mile loops)/day	6
Trailing motorcycle, event = typical day	3 (on three separate days)	2 (20-mile loops)/day	6
Trailing motorcycle, event = a typical day	3 (on three separate days)	2 (20-mile loops)/day	6
Lead SUV, event = one road loop	3 ten-mile loops	1	3
Trailing SUV, event = one road loop	3 ten-mile loops	1	3
Lead ATV lead, event = one riding day	3 (on three separate days)	2 (10 mile loops)	6
Trailing ATV, event = one riding day	3 (on three separate days)	2 (10 mile loops)	6
Hiking	2 (on two days)	1	2
Camping	1	1	1
Heavy Maintenance	1	1	1
Light Maintenance	2 (on same day)	1	2
Vehicle Wash with power spray	2 SUV (two days)	1	2
Vehicle Wash with water hose	2 SUV (two days)	1	2
Vehicle vacuum with HEPA	2 SUV (two days)	1	2
Vehicle vacuum without HEPA	2 SUV (two days)	1	2
Ambient Air - 12 hr. samples over 48 hr.	4 (at 3 locations)	1	12
Performance Evaluation	1	1	1
TOTAL NO. SAMPLES			**63**

Appendix A
Data Quality Objective Process

Appendix A — DQO Process for Clear Creek Management Area Asbestos Air Sampling

Background

The Clear Creek Management Area (CCMA) is located in San Benito County, California, and is within a 48-square-mile area of serpentine rock that contains large amounts of naturally occurring asbestos. It is managed by the U.S. Department of the Interior, Bureau of Land Management (BLM), Hollister, California. The naturally barren slopes, bald ridges, network of bulldozed mining trails, and isolated location makes the CCMA an ideal location for recreational use by off-road motorcyclists. The users include many families with children, who often camp in the area (Popendorf and Wenk, 1983). The area is also used by rock collectors, hikers, and hunters (BLM, 2003).

A Human Health Risk Assessment for the Clear Creek Management Area was developed in 1992 to assess the risks posed by the inhalation of airborne asbestos generated during off-road vehicle and other site uses. This task will update the 1992 Human Health Risk Assessment (HHRA) by including children as receptors and performing the analysis of collected airborne asbestos samples (quantify and identify the types of asbestos) by Transmission Electron Microscopy (TEM); a technique more applicable to the current understanding of asbestos analysis.

EPA will select a qualified analytical laboratory to perform the analysis of collected asbestos samples by TEM. EPA plans to conduct sampling of airborne asbestos in 2004 using resources to be provided (or contracted for) by CH2M HILL.

During all sampling activities, the contracted motorcyclists will wear protective equipment including helmets, filter masks to minimize respired fibers and dust (similar to RESPRO brand "Sportsta Mask and Sportsta Filter", a Hepa-Type sub-micron filter), and overall "jump-suits" similar to those used by BLM personnel at CCMA. All appropriate personal protective equipment (PPE) requirements will be included in the site-specific HSP (Appendix F).

1. State the Problem

Since the late 1970's the BLM has conducted studies to identify and quantify the dust exposures of recreational users and rangers with the CCMA (Popendorf and Wenk, 1983). The "Human Health Risk Assessment for the Clear Creek Management Area" was developed for the BLM by PTI Environmental Services (1992) to assess the potential hazards and risks posed to public health associated with the inhalation of airborne asbestos generated during off-road vehicle use, as well as other site uses that generate less dust. This current task responds to EPA's request to update the 1992 Human Health Risk Assessment (HHRA) by:

- Including children as receptors, and
- Using current state-of-the-science Transmission Electron Microscopy (TEM) to identify and quantify asbestos.

Air monitoring samples containing asbestos fibers will be collected by study participants performing recreational activities at the CCMA. Based on the exposure assumptions and the results of the Human Health Risk Assessment for the CCMA (PTI, 1992), the required limit of detection (asbestos concentration in fibers per cubic centimeter) was estimated (95-percent upper confidence limit on the average concentration). These limits of detection (PCM equivalent fibers) will permit a cancer risk of 1E-06, to be calculated:

- Off highway vehicle riding scenario: 0.017 f/cc. For the off highway riding scenario, the CCMA measured asbestos air concentration of 0.066 f/cc (95-percent upper confidence limit on the average concentration) was the equivalent to an excess cancer risk of 4E-06 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.017 f/cc for an excess cancer risk of 1E-06.
- Other activities scenario: 0.004 f/cc. For the other activities scenario, the CCMA measured asbestos air concentration of 0.04 f/cc (95-percent upper confidence limit on the average concentration) was the equivalent to an excess cancer risk of 1E-05 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.004 f/cc for an excess cancer risk of 1E-06.

2. Identify the Decision

What was the Decision Statement? Does airborne asbestos generated in on-site air during recreational activities at the CCMA pose a significant potential human health risk to adult and child recreational users, and campers at the CCMA.

The ultimate goal of this work is to obtain a body of data that can be extrapolated in some meaningful way (either representatively or conservatively) to experiences, activities, and conditions at the CCMA in general. The dataset can then be used to support an update of the 1992 Human Health Risk Assessment for the CCMA.

What are the alternative actions that could result for the resolution of the study question?

1. If on-site airborne asbestos is reported at or above the concentration where a potential significant adverse health impact may occur, then further site evaluation or assessment may be conducted.
2. If on-site airborne asbestos is not documented at or above the concentration where a potential significant adverse health impact may occur, no further action would be warranted.
3. Decision Statement: Determine whether naturally occurring asbestos in soils at the CCMA can become airborne at concentrations that may pose potential significant risk to public health and may require further action by EPA and BLM.

3. Identify the Inputs to the Decision

Identify the kind of information required to resolve the decision statement. Site-specific information regarding the types and concentrations of airborne asbestos fibers associated with activities typical of BLM workers and recreational visitors including off-road motorcycling, hiking, and camping activities is required to resolve the decision statement.

Identify the sources of information. Analytical laboratory results from the proposed air sampling and subsequent analysis by TEM to identify the types and concentrations of airborne asbestos fibers collected during sampling events at the CCMA.

What sampling and analytical methods are appropriate? On-site air sampling during recreational activities will be conducted using established standard methodology. The US EPA Region 8, Standard Operating Procedure (SOP) for the Sampling of Asbestos Fibers in Air (SOP EPA-Libby-01, Revision 31, March 2001) will be consulted and used as a standardized method for sampling air to measure the concentration of asbestos fibers. A copy of this SOP is presented in Appendix C. This SOP is applicable to any type of asbestos fiber (chrysotile, amphibole) that may exist in air (indoor or outdoor) and is applicable to both personal and ambient air sampling techniques. Filters collected in this way are suitable for examination by a variety of microscopic techniques.

Subsequent laboratory analysis using TEM will identify and determine asbestos fiber concentrations using TEM methodology based on International Organization for Standardization (ISO), International Standard, ISO 10312 (1995(E), Ambient Air – Determination of Asbestos Fibers – direct-transfer TEM Method, describing methodology for TEM analysis, including:

- Asbestos fibers and complex structures:
  - Fibers between 0.5 µm (micrometers) and 5 µm in length
  - Fibers and Structures greater than 5 µm in length
  - PCM equivalent fibers and structures (greater than 5 µm in length with a 3:1 aspect ratio)
  - Fibers and structures greater than 0.5 µm in length with a 5:1 aspect ratio.
- Asbestos fiber mineral identification procedures (e.g. chrysotile, asbestiform amphibole, and other "regulated" asbestiform minerals; as well as any other asbestiform fibers identified during TEM analysis including unregulated fibers (e.g. wincherite and richerite), cleavage fragments, and transition fibers:
  - Energy Dispersive X-ray Analysis
  - Electron Diffraction.

The proposed laboratory for this study has been identified by U.S. EPA Region 9 as Lab/Cor, Inc. (Seattle, Washington). Appendix D includes an example Asbestos Analysis Test Report and an Electronic Data Deliverable (EDD) from Lab/Cor, Inc. The asbestos structure types which will be reported include:

- Primary Structures
- Total Asbestos Structures
- Asbestos Fibers 0.5 - 5µm
- Asbestos Structures >5µm

- Asbestos Fibers and Bundles > 5µm
- PCM Equivalent Fibers
- PCM Equivalent Structures
- Protocol Asbestos Structures 5-10
- Protocol Asbestos Structures >10
- Protocol Asbestos Structures Total
- Protocol Chrysotile Structures 5-10
- Protocol Chrysotile Structures >10
- Protocol Chrysotile Structures Total
- Protocol Amphibole Structures 5-10
- Protocol Amphibole Structures >10
- Protocol Amphibole Structures Total
- Cleavage Fragments
- Transitional Structures.

4. Define Spatial and Temporal Boundaries

What population was sampled? The populations which are proposed to be sampled include:

- Adult users of the CCMA recreational features (Note that child exposures will be estimated in the subsequent human health risk assessment based on samples collected by adult riders):
  - Off-road motorcycle riders (leaders and followers)
  - 4-Wheel Drive OHV (Off Highway Vehicle) riders along CCMA improved dirt roads (with vehicle windows open)
  - ATV (All Terrain Vehicle) riders along CCMA unimproved dirt roads
  - CCMA hikers and campers.
- Adult workers performing:
  - Maintenance with heavy equipment
  - Maintenance with hand tools.
- Adult workers performing decontamination of soiled vehicles:
  - Washing with water hose
  - Washing with pressure sprayer
  - Vacuuming with HEPA filter
  - Vacuuming without HEPA filter.
- Ambient air samples.

What were the spatial boundaries? The spatial boundary of the sampling area will include recreational areas of the CCMA, which are open to the public and managed by the BLM.

During a site visit to CCMA, organized by EPA and hosted by BLM (May 2004), OHV Staging Area #4, located about 3 miles east of the Oak Flat Campground on improved, unpaved road ROO1 on the western side of the CCMA, was identified as a location having attributes which would make it a good location for the base of operations for the CCMA asbestos air sampling. It is a location where on-site camping has and can occur, can be the

site of ambient air sampling, and can serve as a departure point for motorcycle air sampling sessions, and camper and hiker sampling sessions. The dirt road leading from the CCMA western boundary to OHV staging area #4 can also serve for sample collection in the SUV. BLM personnel arriving for the work day from Hollister would also probably enter the CCMA through the west entrance. Additionally, the BLM decontamination facility for vehicles and personnel is located near the west entrance.

Specific locations to be sampled will be determined by consensus between EPA and BLM to be representative locations for the activities to be studied:

- Motorcycling
- Hiking and camping
- BLM Maintenance activities
- Decontamination of soiled vehicles
- Ambient air locations.

What was an appropriate time frame for sampling? The proposed planned time frame for air sampling is summer (or fall) of 2004, when recreational users visit CCMA for off-road motorcycle riding and when the on-site soils are dry and weather conditions are appropriate for the formation of airborne asbestos containing dust during recreational activities. Additional sampling events during wet weather may also be conducted.

What were the practical constraints for collecting data? Practical constraints on air sample data collection include:

- Overloading of particulate and/or asbestos fibers on the sample filters over the sampling period could cause sufficient back pressure to cause the sampling pumps to slow or stop. To help address this potential problem 0.8 μm pore size sample collection filters will be used, which are less sensitive to being clogged up by dust.
- Required sampling times to meet detection limits may exceed operating times of the battery powered air pumps. As an example, for a 400 Liter sample, the TEM analyst would have to read in the neighborhood of 15 – 17 grid openings to achieve an analytical sensitivity of 0.005 S/cc. To attain a 95% confidence interval for the TEM analysis, it will require 45 – 50 grid openings to be analyzed for a 400 Liter sample. It would be more practical and decrease analytical costs, if personal samples could be taken in a cumulative manner to increase the air volume that passes through the filter. If a motorcyclist could ride for ten separate, 440 L, air sample collection sessions with the pump running only when the cyclists was actively riding, then a total of 4000 liters of sample would be taken. A 95% confidence interval would necessitate the TEM analyst only read about 2 to 3 grid openings to achieve 0.005 S/cc.
- Rainy weather conditions could preclude motorcycle riding and other recreational activities at BLM.
- The particulate and asbestos fibers collected on the sample filter may be shaken off during motorcycle riding on rough terrain, or other recreational activities where the filters are shaken.
- The number of grid openings required to be counted to meet the screening action level may be cost prohibitive. It would be more practical and decrease analytical costs, if personal samples could be taken in a cumulative manner to increase the air volume that passes through the filter.

- Study participants will be able to perform the evaluated activities and collect samples of asbestos containing air from only relatively small areas of the asbestos impacted, 50,000-acre CCMA. However the monitored activities such as the motorcycle riders will in fact be collecting composite air samples over large lengths of the dirt roads and trials when rides covering about 25 miles of roads and trails are monitored.

What was the scale of the decision making? The scale of the decision making area of concern is the CCMA. Motorcycling is currently restricted to seven designated OHV (Off Highway Vehicle) Hillclimb Zone – Open Play Areas in the northwest portion of the CCMA (BLM 2003). Camping and hiking activities occur in areas which are not closed to the public for these activities.

5. Develop a Decision Rule

What was the decision rule and Action Level? The potential for human health risk, for adult and child recreational users of the CCMA, exceeding 1E-06, and within the range of 1E-06 to 1E-04 would result in a risk management decision by EPA (as would risks exceeding 1E-04). Risks equal to or less than 1E-06 are generally assumed to be insignificant in the Superfund program. The following are proposed decision rules:

- If asbestos concentrations are documented to occur above a human health risk of 1E-06 in the breathing zone air of recreational users or ambient air samples collected at CCMA, then additional study or mitigation by EPA may be required.
- If asbestos concentrations are not documented to occur above a human health risk of 1E-06 in breathing zone air of recreational users or ambient air samples collected at CCMA, then additional study or mitigation by EPA may not be required.

6. Specify Tolerable Limits on Decision Errors

How was the baseline condition set? The following null hypothesis was set for the baseline condition:

- Ho = The airborne concentration of asbestos is greater than the *de minimus* risk level of 1E-06.
- Ha = The airborne concentration of asbestos is less than the *de minimus* risk level of 1E-06.

A false negative occurs when the null hypothesis if falsely accepted. In this case, a false negative would occur when the decision maker determines that the concentration of asbestos exceeds the action level, when, in fact, it does not. This type of decision error could result in unnecessary expenditures for further assessment or mitigation.

A false positive occurs when the null hypothesis is falsely rejected. In this case, a false positive would occur when the decision maker determines that the concentrations of asbestos is not greater that the action level, when in fact it is. This decision error could result in a threat to public health.

How was the gray region specified? For this site, EPA may not make a decision to perform additional studies or mitigation for all risk values within the range of 1E-06 to 1E-04. Therefore, the range of possible parameters, where the consequences of a false negative decision error are relatively minor (Gray region), would include all portions of the risk

management range for which EPA would in point of fact not decide to perform additional study or mitigation for this site.

How were tolerable decision error limits set? The use of directed, judgmental sampling (i.e. collection of all samples during recreational activities by study participants) reduces the occurrence of decision errors due to random sampling. Therefore measurement error is the only statistically assessable component of decision error for this decision rule. Laboratory results which meet data validation QA/QC requirements will serve to limit measurement error.

7. Optimize Design for Obtaining Data

What was the selected sampling design? The selected sampling design is to conduct judgmental sampling to collect breathing zone air samples during the recreational activities (motorcycling, camping, hiking) and vehicle clean-up activities of CMA study participants during the dry and transitional seasons at CCMA.

What were the key assumptions supporting the selected design? The key assumption of the sampling design was that the activities of recreational visitors to the CCMA would cause increases in the asbestos air concentrations in the breathing zone of motorcyclists (lead and follower motorcyclists) and fellow campers and hikers.

These assumptions are tentative, as the conditions for sampling may require decisions during the sampling process. This plan will serve as a guide for the sampling team. Their judgment, and the judgment of other on-site experts during sampling events can supersede this document, should a justifiable need arise. Any modifications made during the sampling event will be documented in the final report.

Appendix B
Activity Scenario Scripts

Appendix B - Activity Scenario Scripts

The following are activity scripts for the recreational and maintenance activity participants, which briefly describe the specific types of activities that will be monitored at CCMA: recreational vehicle operation, hiking, camping, maintenance activities, vehicle decontamination, and ambient air sampling. Additionally several soil samples will be collected on route during several of activities described below:

Recreational Vehicle Operation. Each type of recreational vehicle operator will be monitored on same road loop. Several soil samples will also be collected on the route for soil moisture determination.

- Motorcycle. Equipment: "motocross" type bikes with rock and hand guards will be used. (The rock and hand guards will be optional in light of the proposed 5-mile graded road loop route beginning at Staging Area 4). A group of 3 riders, wearing personal air samplers, will travel in single file, the distance between riders will be maintained based on visibility, terrain, and safety considerations. The second and third trailing riders will ride in the dust cloud of the rider in front as much as safe and practical. Exact route to be determined, 15-20 mile loop traversing representative terrain including hills and barrens, average speed about 18 mph. Riders may need to replace cartridges in route. A total of 3 ride repeats/day on 2 separate days is proposed for a total of 6 samples for each rider (assuming no cartridge changes are made in route).

  These samples are intended to be representative of the type of recreational exposures experienced by lead and follower motorcyclists at CCMA. The two follower motor cyclists, who ride in the dust clouds stirred up by the of the rider in front, are expected to represent a potentially greater exposure than the lead motorcycle rider. In contrast, the lead motorcyclist is not expected to ride in a dust cloud stirred up by other motorcyclists. Multiple samples are proposed to be collected in order to provide a general indication of exposure variability under the sampling conditions over a 2 day period.

- 4-Wheel Drive OHV (Off Highway Vehicle). Equipment: 2, 4-wheel drive OHV vehicles will be used. Both vehicles will be driven in single file, with windows open, a personal air sampler will be worn by the drivers of both leading and trailing vehicles. Distance between vehicles will be maintained based on terrain, visibility, and safety considerations at an average speed about 10 mph. The trailing vehicle will be in the dust cloud of the leading vehicle. A 5-mile loop on improved dirt roads will be driven starting from base camp area (Staging Area Number 4). A total of 2 OHV repeats/day on 3 days is proposed for a total of 6 samples for each OHV (assuming no cartridge changes are made in route).

  Similar to the motorcyclists described above, these samples are intended to be representative of the type of recreational exposures experienced by lead and follower 4-Wheel Drive OHV drivers and riders at CCMA.

- ATV (All Terrain Vehicle). Equipment: 2, 4 wheel ATVs (also referred to as "quads") will be used. Both vehicles will be driven in single file on a 10-mile loop on unimproved dirt road over representative terrain, at an average speed of about 10 mph. Distance between riders will be maintained based on terrain, visibility, safety considerations. The trailing rider will be in the dust cloud of the leading rider. Both riders will be equipped with air samplers. A total of 2 ATV repeats/day on 3 day2 is proposed for a total of 6 samples for each ATV (assuming no cartridge changes are made in route).

  Similar to the 4-Wheel Drive OHV drivers described above, these samples are intended to be representative of the type of recreational exposures experienced by lead and follower ATV drivers at CCMA.

Hiking. One person, wearing a personal air sampler, will hike about 3 miles along a CCMA hiking trail with varied terrain (Possibly Indian Hill - near Staging Area 4). The hike could include a rest stop during which the hiker sits on a rock or stump and eats a snack. The hiker will maintain a casual pace (e.g., 1-2 miles/hr). This activity will take about 2 hours. These samples are intended to be representative of the type of recreational exposures experienced by hikers at CCMA.

Camping. One person, wearing a personal air sampler (could be the same person who hiked earlier in the day), will camp overnight near the ambient air monitor. Camping activities will include cooking a meal and pitching a tent. The camp activity will commence in the early evening and end the next morning, when the tent is taken down. These samples are intended to be representative of the type of recreational exposures experienced by campers at CCMA. A stationary monitor will be placed inside the tent for 8 hours to simulate a sleeping camper.

BLM Maintenance Activities. The following types of typical BLM CCMA maintenance activities will be monitored. A representative from BLM (Tim Moore, Hollister BLM office) will coordinate maintenance activities. (Note: If coincident with other sampling activities, additional meteorological data, soil moisture, and ambient air sampling will not be collected.) These samples are intended to be representative of the type of occupational exposures experienced by BLM workers at CCMA.

- Heavy Maintenance. One person will walk alongside heavy equipment (e.g.bulldozer) as it traverses terrain and carries out maintenance (e.g., grading). The duration of this activity will depend on the exact activity.
- Light Maintenance. One person will use hand tools to carry out a maintenance activity, such as repairing a fence, installing a fence post, filling in pot holes, etc. This activity would be monitored for about 2 hours.

Vehicle Decontamination at BLM Facility. The vehicles used during the study will be decontaminated at the BLM vehicle decontamination facility located outside the CCMA. These samples are intended to be representative of the type of exposures experienced by both BLM workers and recreational visitors to CCMA during vehicle decontamination after a visit to CCMA .

- Vehicle Washing. One person each will use both a pressure spray hose and a garden (no pressure) hose to separately wash one of the two SUVs. Each activity will be monitored separately.

- Vehicle Vacuuming. The same two persons who washed the vehicles will separately vacuum the interiors of each of the two SUVs with fresh filter cartridges on the personal monitors. One of the vacuums will have a HEPA filter and one will not.

Ambient Air Sampling. Ambient air sample will be collected before and during the personal air monitoring sample collection. Local meteorological data will be collected at the time of the ambient air sampling: wind speed, direction, humidity, and rainfall. These samples will provide an indication of ambient outdoor air asbestos levels at the time of personal air sampling monitoring. Proposed locations include the following:

- Oak Flat campground. Air sampling at Oak Flat campground would reflect ambient air conditions at the entrance to CCMA during a 12-hour sampling event.

- Staging Area 4. Air sampling at Staging Area 4 would reflect conditions at the camping area and would be coincident with the proposed starting point for all monitored activities during 2, 12 hour sampling events (one event on each day of air monitoring sampling).

- Natural area remote from graded roads and trail areas. Air sampling at a natural area remote from graded roads and trail areas would reflects conditions of the larger CCMA geographical area, without extensive human intervention, during the time period of air monitoring.

Appendix C
US EPA Region 8, Standard Operating Procedure (SOP) for the Sampling of Asbestos Fibers in Air (SOP EPA-Libby-01, Revision #1, March 2001

The Appendix C SOP may be accessed at the following website:

www.epa.gov/region08/superfund/libby/QAPP-P2-A-Air_.pdf

Appendix D
Lab/Cor, Inc.: Example Asbestos Analysis Test Report; Electronic Data Deliverable (EDD)

Contact Remedial Project Manager of the Atlas Superfund Site (suer.lynn@epa.gov) to obtain the contents of this appendix.

Appendix E
Response to Comments on Draft Sampling and Analysis Plan: Cal EPA DTSC and BLM

Response to DTSC Comments on the Draft Sampling and Analysis Plan for Asbestos Air Sampling, Clear Creek Management Area, California

PREPARED FOR: EPA Region 9; Lynn Suer, WAM, Atlas Asbestos CCMA HHRA

PREPARED BY: Richard Braun, PhD/SCO

COPIES: Caroline Ziegler/SFO

DATE: October 26, 2004

The purpose of this memo is to provide responses to comments, dated July 9, 2004, offered by Fran Collier, M. S., Associate toxicologist, CalEPA DTSC, Human and Ecological Risk Division (HERD) on the Draft Sampling and Analysis Plan for Asbestos Air Sampling, Clear Creek Management Area, San Benito County, California (dated June 15, 2004). The Sampling and Analysis Plan (SAP) was developed to direct the on-site collection of asbestos fibers from personal breathing space air samples, using standard asbestos sampling techniques (using a calibrated air pump attached to a plastic cassette, which contains an asbestos fiber sampling filter). The collected samples will be sent to an analytical laboratory and analyzed for asbestos type and concentrations in air by TEM. The results of the sampling will be used to update the 1992 Human Health Risk Assessment (HHRA) for the CCMA.

DTSC offered both general and specific comments on the SAP. The format followed in this document is to present each comment followed by the response to the comment.

Scope of Review

HERD has reviewed this document with emphasis on those aspects that affect the risk to human health. HERD's review addressed issues concerning sampling and analysis, as well as reporting for this investigation.

General Comments

1. Comment: HERD recommends that the SAP provide more details about specific data quality objectives for each study component including sample collection methods, analysis methods, data evaluation and use of data for exposure and risk assessment. The SAP currently provides general descriptions for these components; however, the state of the science in sample collection methods, analysis methods, data evaluation, exposure and risk assessment is evolving. As a result, HERD believes that a detailed SAP that describes the specific procedures, including any interpretation or modification to the referenced methods, will result in a stronger foundation for making risk

management decisions at CCMA and guiding future studies evaluating NOA releases and potential exposures.

Response: The requested clarifications are presented in the following sections:

- Sample collection methods: Appendix B (Activity Scenario Scripts), Table 1, "Parameters for CCMA Activity-Based Air Sampling", and Appendix C (US EPA Region 8, Standard Operating Procedure for the Sampling of Asbestos Fibers in Air). To clarify the sample collection by study participants, activity scenario scripts were written for all study participant related activities, and are presented in Appendix B. Additionally, Table 1 presents, for each activity, the proposed number of sampling events, the personal air sampler flow rate, and sampling duration. Further, to provide robust documentation of the proposed sample collection methodology, the US EPA SOP for the Sampling of Asbestos Fibers in Air, which is approved for the Libby Superfund site is presented in Appendix C.

- Analysis Methods: International Standard ISO 10312, Ambient Air Determination of Asbestos Fibers and Appendix E (Lab/Cor, Inc.: Example Asbestos Analysis Test Report, and Electronic Data Deliverable). Clarification of the analysis methods are presented in the ISO 10312 Standard Method for TEM analysis of asbestos fibers (which is referenced in the text as the methodology which will be followed in the TEM analysis) and Appendix E, which presents an example asbestos analysis test report and example electronic data deliverable from the identified laboratory for this project, Lab/Cor, Inc., Seattle, Washington.

- Data Evaluation and Use of Data for Exposure and Risk Assessment. A separate HHRA Work Plan document is planned to be developed by U. S. EPA for this project. This comment will be addressed as part of the development of the risk assessment work plan.

2. Comment: HERD recommends that USEPA and BLM proceed with the AVARIS Fly over of CCMA to characterize geological formations and identify areas where asbestos may potentially be found. This information will help characterize the CCMA and aid in evaluating management practices, including realigning existing trails and locating new trails and activity centers away from areas that contain asbestos.

   Response: This comment is out of the scope of the present SAP. It will be addressed by U.S. EPA under a separate venue.

3. Comment: In the June 29 conference call, USEPA, CH2MHill, BLM and DTSC staff discussed the possibility of preparing a workplan describing how risks will be assessed from the data collected. HERD recommends that a risk assessment workplan be developed describing the activity scenarios and information collected and how these data will be used to assess potential risk.

- Response: Appendix B (Activity Scenario Scripts): The activity scenarios to be performed by the study participants are presented in Appendix B. A separate risk assessment Work Plan document is planned to be developed by U. S. EPA for this project. This comment will be further addressed as part of the development of the risk assessment work plan.

4. Comment: The SAP identifies several different methods for collection and analysis of airborne asbestos fibers. The various methods have different sample preparation and analysis methods. HERD recommends that the SAP specify which sample collection, preparation and analysis methods will be used for each sampling event, including the objective and use of the data. For example, the personal sampler filters may be analyzed by PCM to comply with OSHA requirements for worker exposure in an eight-hour time period; however for purposes of studying short-term exposures such as the activities proposed in the SAP, the TEM method is more appropriate. Also, HERD recommends that the ISO 10312 method be used for TEM analysis in this study instead of the NIOSH 7402 and AHERA methods. The ISO method provides the greatest amount of detail in analyzing filters and is most flexible for using data for different purposes.

   Response: Appendix C (US EPA Region 8, Standard Operating Procedure for the Sampling of Asbestos Fibers in Air); International Standard ISO 10312, Ambient Air Determination of Asbestos Fibers; and Appendix E (Lab/Cor, Inc.: Example Asbestos Analysis Test Report, and Electronic Data Deliverable). As a response to this comment and to address other similar concerns, Appendix C presents U.S. EPA approved methodology for asbestos air sample collection; ISO 10312 which presents and internationally developed method for asbestos air sample TEM analysis is referenced in the text as the methodology which will be followed in the TEM analysis; and Appendix E provides an example laboratory analysis test report and EDD.

Specific Comments

1. Comment: Section 2.1 generally describes the activity/exposure scenarios and the number of events that will be monitored. HERD recommends that the SAP describe how many people will participate in each event, who will wear personal samplers and the rationale for selecting this/these individuals. HERD understands that specific scripts will be prepared for each activity scenario and event for review and comment prior to finalizing the SAP. HERD encourages USEPA to collect sufficient samples to provide statistically significant representative exposure data for each scenario.

   Response: Appendix B (Activity Scenario Scripts) and Table 1, "Parameters for CCMA Activity-Based Air Sampling": To clarify the sample collection by study participants, activity scenario scripts were written for all study participant related exposures and are presented in Appendix B. Additionally, Table 1 presents for each activity, the proposed number of sampling events, the personal air sampler flow rate, and sampling duration.

2. Comment: Section 2.1 also states that ambient air conditions will be assessed using stationary high volume samplers. HERD recommends that the SAP describe where stationary samplers will be placed, how many will be used and the duration of each event, the rationale for locating the sample in the proposed locations, and how the ambient data will be used. HERD also recommends that the SAP include procedures for calibrating, maintaining and recording flow rates for each sampler and event. HERD also recommends that meteorological data be collected to assess wind speed and direction, humidity, and temperature.

   Response: Appendix B (Activity Scenario Scripts) and Table 1, "Parameters for CCMA Activity-Based Air Sampling", and Appendix C (US EPA Region 8, Standard Operating Procedure for the Sampling of Asbestos Fibers in Air) contain the requested clarifications.

3. Comment: Section 2.2 states that 0.8 micron pore diameter filters will be used instead of the standard 0.45 micron filters to reduce the potential of overloading filters. HERD recommends that the SAP include information on studies that assess the correlation of asbestos assessments among the two filter types. Alternatively, consider using the 0.45 micron filter and changing filters more often.

   Response: To provide robust documentation of the proposed sample collection methodology, the US EPA SOP for the Sampling of Asbestos Fibers in Air, which is approved for the Libby Superfund site is presented in Appendix C (US EPA Region 8, Standard Operating Procedure for the Sampling of Asbestos Fibers in Air). This protocol specifies the use of 0.8 micron filters for asbestos air sampling.

4. Comment: Section 2.3.2 states that photographs will be taken during the air sampling events. HERD recommends using video cameras, where possible, to record activities and the dust plumes that are created. This information helps to visually assess the magnitude and the duration of the generated plumes.

   Response, Section 2.3.2: The following clarification has been added to this section: "Videotape records of selected air sampling activities will also be conducted to record events such as the generation of dust plumes generated by passing motorcycles, 4-wheel drive OHVs, and ATVs. This information may help to visually assess the magnitude and duration of the generated plumes."

5. Comment: Section 2.4.2 provides limits of detection (PCM equivalent fibers) based on a 1E-06 cancer risk. HERD recommends providing an expanded discussion on the specific exposure assumptions and calculations used to derive the detection limits of 0.017 fibers per cubic centimeter (f/cc) for off highway vehicle riding scenario and 0.004 f/cc for the "other activity" scenario.

   Response, Section 2.4.2: The following clarification has been added to this section: "based on the exposure assumptions and the results of the Human Health Risk

Assessment for the CCMA (PTI, 1992), the required limit of detection (asbestos concentration in fibers per cubic centimeter) was estimated (95-percent upper confidence limit on the average concentration). These limits of detection (PCM equivalent fibers) will permit a cancer risk of 1E-06, to be calculated:

- Off highway vehicle riding scenario: 0.017 f/cc. For the off highway riding scenario, the CCMA measured asbestos air concentration of 0.066 f/cc (95-percent upper confidence limit on the average concentration) was the equivalent to an excess cancer risk of 4E-06 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.017 f/cc for an excess cancer risk of 1E-06.

- Other activity scenario: 0.004 f/cc. For the other activities scenario, the CCMA measured asbestos air concentration of 0.04 f/cc (95-percent upper confidence limit on the average concentration) was the equivalent to an excess cancer risk of 1E-05 for an exposure frequency of one day per year for 30 years. This is the equivalent to 0.004 f/cc for an excess cancer risk of 1E-06."

6. Comment: HERD also recommends that language be added to Section 2.4.2 describing how cleavage fragments and transition fibers will be addressed in the risk analysis.

   Response: Clarification has been added to Section 2.4.2 to address the issue of cleavage fragments, and transition fibers.

7. Comment: Section 2.5 describes the Quality Control measures for this project. HERD recommends providing more detail on how duplicate personal and stationary field samples will be collected. HERD also recommends that the section provide more detail on laboratory quality control including replicate counts, split filter analyses, recounting of the same filter(s) by a different analyst, and possible filter splits with a second lab that also meets USEPA qualifications.

   Response: Clarifications have been added to Section 2.5 to address this comment.

8. Comment: Appendix A: Section 3 describes the general kinds of information, the sources of information and lists various analytical methods. HERD recommends that this section describe the specific reporting of analytical results for each method to be used. This reviewer understands from our conference calls that the ISO 10312 method will be used for evaluating air samples. HERD recommends that the SAP describe the information to be presented on the data sheets and the data summary tables. HERD recommends including information such as fiber dimensions and type of asbestos fiber, if it is a cleavage fragment or transition fiber, numbers of complex structures, numbers of fibers less than five microns, those greater than five microns, PCMe equivalent fibers.

Response: Analysis Methods: International Standard ISO 10312, Ambient Air Determination of Asbestos Fibers) and Appendix E (Lab/Cor, Inc.: Example Asbestos Analysis Test Report, and Electronic Data Deliverable): The following clarifications have been added. Clarification of the analysis methods are presented in the ISO 10312 Standard Method for TEM analysis of asbestos fibers (which is referenced in the text as the methodology which will be followed in the TEM analysis) and in Appendix D, which presents an example asbestos analysis test report and example electronic data deliverable from the identified laboratory for this project, Lab/Cor, Inc., Seattle, Washington.

Response to BLM Comments on the Draft Sampling and Analysis Plan for Asbestos Air Sampling, Clear Creek Management Area, California

PREPARED FOR: EPA Region 9; Lynn Suer, WAM, Atlas Asbestos CCMA HHRA

PREPARED BY: Richard Braun, PhD/SCO

COPIES: Caroline Ziegler/SFO

DATE: October 26, 2004

The purpose of this memo is to provide responses to comments, dated June 18, 2004, offered by Tim Moore, Geologist, BLM (Bureau of Land Management), Hollister Field Office, Hollister, California on the Draft Sampling and Analysis Plan for Asbestos Air Sampling, Clear Creek Management Area, San Benito County, California (dated June 15, 2004). The Sampling and Analysis Plan (SAP) was developed to direct the on-site collection of asbestos fibers from personal breathing space air samples, using standard asbestos sampling techniques (using a calibrated air pump attached to a plastic cassette, which contains an asbestos fiber sampling filter). The collected samples will be sent to an analytical laboratory and analyzed for asbestos type and concentrations in air by TEM. The results of the sampling will be used to update the 1992 Human Health Risk Assessment (HHRA) for the CCMA.

BLM offered both general and specific comments on the SAP. The format followed in this document is to present each comment followed by the response to the comment.

General Comments.

1. Comment: Respiratory protection should be OSHA certified.

   Response: The site-specific health and safety plan is presented as Appendix F to the SAP. The proper level of respiratory protection required for the field activities at the CCMA is addressed in the health and safety plan.

2. Comment: No participants should be exposed above a PEL unless PPE is worn.

   Response: The proper level of PPE required for the field activities at the CCMA is addressed in the health and safety plan.

3. Comment: PTI dataset should be incorporated into this report by reference, and reviewed to see if the 2004 samples are statistically similar to the 1992 data (PCME/TEM). See Subheading 2.9 on page 16.

   Response, Section 2.9. The results and conclusions of the "Human Health Risk Assessment for the Clear Creek Management Area" developed for the BLM by PTI Environmental Services (1992) were used to estimate the limit of detection (PCM equivalent fibers) which will correspond to a cancer risk of 1E-06. A workplan will be developed for the Human Health Risk Assessment for the update to the 1992 Human Health Risk Assessment (HHRA) for the CCMA. The results and conclusions of the proposed HHRA update will be compared to the 1992 PTI HHRA.

4. Comment: Schedule is important to pin down. Target for August (too soon?) or October. On a personal note I'm getting married in Sept so this month is bad for me.

   Response, Section 1.3.2. Asbestos sample collection activities are planned for late 2004, probably early November.

Specific Comments.

1. Comment: on page 9, subheading 2.1, 1st bullet, motorcyclist (lead rider) 3 sampling events 2nd bullet, motorcyclist (following rider) 6 sampling events does this mean lead rider (3 events) + mid rider (3 events) + tail rider (3 events) = 9 events?

   Response, Section 2.1. The scenario clarifications requested, for all scenarios, are included in Appendix B (Activity Scenario Scripts) and Table 1, "Parameters for CCMA Activity-Based Air Sampling" which were developed to address this and other similar concerns. To clarify the proposed exposure scenarios, activity scenario scripts were written for all study participant related activities and are presented in Appendix B. Additionally, Table 1 presents, for each activity, the proposed number of sampling events, the personal air sampler flow rate, and sampling duration.

2. Comment: on page 10, subheading 2.2, 3rd paragraph, what kind of personal air samplers have the ability to run at 5.75 liters/minute?

   Response, Section 2.2: The indicated text has been edited to read: "sampling design requires a sample pump that is capable of maintaining a constant flow of 2 to 3 liters/minute". . .

3. Comment: on page 14, subheading 2.5.3 Lab quality control samples, it was discussed with Arnold Den about using pre-loaded filters, with a known concentration of asbestos, was this still being considered?

   Response, Section 2.5.1, Performance Evaluation Samples. The following text has been added: "Performance Evaluation (PE) sample cassettes that have a known concentration of asbestos fibers will be supplied by U.S. EPA and transmitted to the laboratory for

analysis. Depending on the QA protocol, one or more asbestos PE samples will be included along with the samples collected, as a further QA check".

4. Comment: on page 16, subheading 2.9 Data Acquisition...it is not anticipated that any historical data sets or data from other sources will be used in the final conclusions of this report" Please consider the PTI data set here and change this portion to reflect the 1992 Risk Assessment.

   Response, Section 2.9: The results and conclusions of the "Human Health Risk Assessment for the Clear Creek Management Area" developed for the BLM by PTI Environmental Services (1992) were used to estimate the limit of detection (PCM equivalent fibers) which will correspond to a cancer risk of 1E-06. A workplan will be developed for the updated HHRA for the CCMA. The results and conclusions of the proposed updated HHRA will be compared to the 1992 PTI HHRA.

5. Comment: on page 27, subheading 4, 2nd & 3rd bullet, BLM workers performing maintenance & BLM performing decontamination. You may want to consider the CH2M-Hill study participants perform these tasks (except the heavy equipment part). If BLM was to use heavy equipment we have to use water trucks to control dust per the Asbestos ATCM. This may "taint" the study. Also most of BLM's heavy equipment is HEPA filtered (bulldozer cab, backhoe cab, etc.)

   We probably need to look at specific activities like trash collection where we do not use HEPA filtered equipment (and this activity usually exceeds the PEL).

   Response: This comment was addressed in Appendix B, Activity Scenario Scripts.

Cal-EPA DTSC HERD Comments

M E M O R A N D U M

TO: Steve Ross
Project Manager
Site Mitigation and Brownfields Reuse Program
Cal Center Office

From: Fran Collier, M.S.
Associate Toxicologist
Human and Ecological Risk Division

Date: July 9, 2004

SUBJECT: Draft Sampling and Analysis Plan for Asbestos Air Sampling Clear Creek Management Area, San Benito County, California

PCA: 11050 **Site Code:** 101717-00

As part of the interagency working agreement, the Human and Ecological Risk Division (HERD) has reviewed a draft Sampling and Analysis Plan (SAP) for Asbestos Air Sampling, Clear Creek Management Area (CCMA), San Benito County, California dated June 15, 2004. The draft SAP was prepared by CH2M Hill for the United States Environmental Protection Agency, Region IX (USEPA).

Background
The CCMA is a 48 square mile area with extensive areas of serpentine rock that potentially contain large amounts of naturally occurring asbestos (NOA). The CCMA is managed by the United States Department of the Interior Bureau of Land Management (BLM). The CCMA is a multi use recreation area used by hunters, campers, rock collectors, and off road vehicle enthusiasts using motorcycles, All Terrain Vehicles (ATV), four-wheel drive automobiles (SUVs) and other recreational vehicles. The San Benito Mountain Research Natural Area is located in the central portion of the CCMA and was established to protect native plant and forest communities.

Previous investigations:
Several studies were conducted in the early 1990's to assess the potential hazards from asbestos exposure to CCMA users. These studies and their results are described in the "Human Health Risk Assessment for the Clear Creek Management Area" prepared by PTI Environmental Services in 1992. The risk assessment resulted in posting warning signs, and preparing informational pamphlets advising visitors of potential health hazards associated with recreational activities at the site and to avoid using the CCMA in hot, dry and dusty conditions.

Proposed Work:
The purpose of the new investigation is to collect additional data to update the 1992 risk assessment by collecting air data that accurately represents the levels of asbestos fibers to which recreational users are exposed during typical site visits and to which BLM personnel are exposed during routine management activities. The investigation proposes collecting ambient and personal sample air data while a variety of activity scenarios are enacted by USEPA contractors. Staging area #4 in CCMA will be used as a base of operations to assess potential exposures to adults and children who use the area. Activities include off road motorcycle riding, SUV riding on the access roads, hiking and camping. BLM staff routine maintenance activities will be tested, including CCMA maintenance using heavy equipment and hand tools. Potential worker exposure during vehicle decontamination will also be assessed.

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Documents Reviewed
HERD reviewed the draft "Sampling and Analysis Plan (SAP) for Asbestos Air Sampling, Clear Creek Management Area (CCMA), San Benito County, California" dated June 15, 2004. The draft SAP was prepared by CH2M Hill For the United States Environmental Protection Agency, Region IX (USEPA). Additional information was provided through two conference calls with USEPA, BLM and DTSC staff.

Scope of Review
HERD has reviewed this document with emphasis on those aspects that affect the risk to human health. HERD's review addressed issues concerning sampling and analysis, as well as reporting for this investigation. Grammatical or typographical errors that do not affect the evaluation have not been noted.

General Comments

5. HERD recommends that the SAP provide more details about specific data quality objectives for each study component including sample collection methods, analysis methods, data evaluation and use of data for exposure and risk assessment. The SAP currently provides general descriptions for these components; however, the state of the science in sample collection methods, analysis methods, data evaluation, exposure and risk assessment is evolving. As a result, HERD believes that a detailed SAP that describes the specific procedures, including any interpretation or modification to the referenced methods, will result in a stronger foundation for making risk management decisions at CCMA and guiding future studies evaluating NOA releases and potential exposures.

6. HERD recommends that USEPA and BLM proceed with the AVARIS Fly over of CCMA to characterize geological formations and identify areas where asbestos may potentially be found. This information will help characterize the CCMA and aid in evaluating management practices, including realigning existing trails and locating new trails and activity centers away from areas that contain asbestos.

7. In the June 29 conference call, USEPA, CH2MHill, BLM and DTSC staff discussed the possibility of preparing a workplan describing how risks will be assessed from the data collected. HERD recommends that a risk assessment workplan be developed describing the activity scenarios and information collected and how these data will be used to assess potential risk.

8. The SAP identifies several different methods for collection and analysis of airborne asbestos fibers. The various methods have different sample preparation and analysis methods. HERD recommends that the SAP specify which sample collection, preparation and analysis methods will be used for each sampling event, including the objective and use of the data. For example, the personal sampler filters may be analyzed by PCM to comply with OSHA requirements for worker exposure in an eight hour time period; however for purposes of studying short term exposures such as the activities proposed in the SAP, the TEM method is more appropriate. Also, HERD recommends that the ISO 10312 method be used for TEM analysis in this study instead of the NIOSH 7402 and AHERA methods. The ISO method provides the greatest amount of detail in analyzing filters and is most flexible for using data for different purposes.

Specific Comments

9. Section 2.1 generally describes the activity/exposure scenarios and the number of events that will be monitored. HERD recommends that the SAP describe how many people will participate in each event, who will wear personal samplers and the rationale for selecting this/these individuals. HERD understands that specific scripts will be prepared for each activity scenario and event for review and comment prior to finalizing the SAP. HERD encourages USEPA to collect sufficient samples to provide statistically significant representative exposure data for each scenario.

10. Section 2.1 also states that ambient air conditions will be assessed using stationary high volume samplers. HERD recommends that the SAP describe where stationary samplers will be placed, how many will be used and the duration of each event, the rationale for locating the sample in the proposed locations, and how the ambient data will be used. HERD also recommends that the SAP include procedures for calibrating, maintaining and recording flow rates for each sampler and event. HERD also recommends that meteorological data be collected to assess wind speed and direction, humidity, and temperature.

11. Section 2.2 states that 0.8 micron pore diameter filters will be used instead of the standard 0.45 micron filters to reduce the potential of overloading filters. HERD recommends that the SAP include information on studies that assess the correlation of asbestos assessments among the two filter types. Alternatively, consider using the 0.45 micron filter and changing filters more often.

12. Section 2.3.2 states that photographs will be taken during the air sampling events. HERD recommends using video cameras, where possible, to record activities and the

dust plumes that are created. This information helps to visually assess the magnitude and the duration of the generated plumes.

13. Section 2.4.2 provides limits of detection (PCM equivalent fibers) based on a 1E-06 cancer risk. HERD recommends providing an expanded discussion on the specific exposure assumptions and calculations used to derive the detection limits of 0.017 fibers per cubic centimeter (f/cc) for off highway vehicle riding scenario and 0.004 f/cc for the "other activity" scenario.

14. HERD also recommends that language be added to Section 2.4.2 describing how cleavage fragments and transition fibers will be addressed in the risk analysis.

15. Section 2.5 describes the Quality Control measures for this project. HERD recommends providing more detail on how duplicate personal and stationary field samples will be collected. HERD also recommends that the section provide more detail on laboratory quality control including replicate counts, split filter analyses, recounting of the same filter(s) by a different analyst, and possible filter splits with a second lab that also meets USEPA qualifications.

16. Appendix A: Section 3 describes the general kinds of information, the sources of information and lists various analytical methods. HERD recommends that this section describe the specific reporting of analytical results for each method to be used. This reviewer understands from our conference calls that the ISO 10312 method will be used for evaluating air samples. HERD recommends that the SAP describe the information to be presented on the data sheets and the data summary tables. HERD recommends including information such as fiber dimensions and type of asbestos fiber, if it is a cleavage fragment or transition fiber, numbers of complex structures, numbers of fibers less than five microns, those greater than five microns, PCME equivalent fibers.

Conclusions and Recommendations

While, ideally, HERD would recommend that these comments be addressed in a revised SAP, HERD concurs with and supports USEPA's strong desire to complete field work this October. As such, HERD recommends that USEPA respond to these comments as a "Response to Comments" addendum to the SAP. Our experience with asbestos studies has shown that despite extensive details in a SAP, adjustments often need to be made in the field based on current conditions and analysis procedures need to be modified based on findings during laboratory assessment. We have, however, experienced the benefit of extensive documentation of actual field work and laboratory analysis for exposure and risk assessment as well as risk management decisions. As such, HERD recommends that USEPA's response to our comments outline how USEPA will incorporate each comment into the field work and laboratory analysis. HERD recommends that the effort that would be spent to provide a detailed revised SAP, instead be spent on providing extensive documentation of the actual field activities and laboratory analysis of the samples, and that the documentation describe how USEPA addressed HERD's comments.

Because the AVARIS flyover is not directly tied to the activity/exposure assessment SAP, HERD recommends that it be conducted soon after the October field work is completed and prior to finalizing the updated risk assessment.

HERD recommends that the risk assessment work plan be a prepared as a separate document. Ideally, we would recommend that it be prepared and reviewed concurrent with the SAP, however, in the interest of insuring that the field work occurs this year, HERD concurs with the USEPA proposal to submit the draft work plan for review and discussion following the field work.

The recommendations made in this document are site specific and should not be construed as a policy decision applicable to other sites. If you have any questions regarding the above comments, please feel free to contact me at (916) 255-6431 or by e-mail at fcollier @dtsc.ca. gov.

Reviewed by: David Berry, Ph D
Senior Toxicologist, HERD

BLM Comments

----- Forwarded by Lynn Suer/R9/USEPA/US on 06/18/2004 03:07 PM ----
-

From: Timothy_Moore@ca.blm.gov
To: Lynn Suer/R9/USEPA/US@EPA
cc:
06/18/2004 11:58
Subject: Re: asbestos risk assessment SAP comments
AM

General Comments:

1) Respiratory protection should be OSHA certified.

2) No participants should be exposed above a PEL unless PPE is worn.

3) PTI dataset should be incorporated into this report by reference, and reviewed to see if the 2004 samples are statistically similar to the
1992 data (PCME/TEM). See Subheading 2.9 on page 16.

4) Schedule is important to pin down. Target for August (too soon?) or October. On a personal note I'm getting married in Sept so this month is bad for me.

Specific Comments:

1) on page 9, subheading 2.1, 1st bullet, motorcyclist (lead rider) 3 sampling events
2nd bullet, motorcyclist (following rider) 6 sampling events

does this mean lead rider (3 events) + mid rider (3 events) + tail rider (3 events) = 9 events?

2) on page 10, subheading 2.2, 3rd paragraph, what kind of personal air samplers have the ability to run at 5.75 liters/minute?

3) on page 14, subheading 2.5.3 Lab quality control samples, it was discussed with Arnold Den about using pre-loaded filters, with a known concentration of asbestos, was this still being considered?

4) on page 16, subheading 2.9 Data Acquisition, ...it is not anticipated that any historical data sets or data from other sources

will be used in the final conclusions of this report" Please consider the PTI data set here and change this portion to reflect the 1992 Risk Assessment.

5) on page 27, subheading 4, 2nd & 3rd bullet, BLM workers performing maintenance & BLM performing decon. You may want to consider the CH2M-Hill study participants perform these tasks (except the heavy equipt. part). If BLM was to use heavy equipment we have to use water trucks to control dust per the Asbestos ATCM. This may "taint" the study. Also most of BLM's heavy equipment is HEPA filtered (dozer cab, backhoe cab,etc.)

We probably need to look at specific activities like trash collection where we do not use HEPA filtered equipment (and this activity usually exceeds the PEL).

Appendix F
Site-Specific Health and Safety Plan