U.S. Environmental Protection Agency – Region 9
Clear Creek Management Area (CCMA) Asbestos Exposure and Risk Assessment

Frequently Asked Questions

Q: Why did EPA do the assessment?

A: In the 1991 Record of Decision selecting a cleanup remedy for the Atlas Asbestos Mine Superfund site, which is located within the CCMA, EPA stated that it would evaluate whether the Bureau of Land Management's (BLM) plans for managing the CCMA were adequate to protect public health from asbestos exposure. Since that time, EPA has monitored BLM's Resource Management Plan process and has commented on the adequacy of BLM's management for asbestos exposure. In 2004, as part of the process of evaluating the Atlas Mine cleanup for possible delisting of the site from the federal Superfund list, EPA Region 9 initiated an asbestos exposure and human health risk assessment for the CCMA. The goal of the assessment was to use current asbestos sampling and analytical techniques to update a 1992 BLM Human Health Risk Assessment and provide more robust information to BLM on the asbestos exposures from typical CCMA recreational activities and the potential cancer risks associated with those exposures. In addition, as families are frequent visitors to CCMA, the assessment estimated exposures and potential risks to children (using adult samplers), as well as adults.

Q: What did EPA do?

A: In 2004 and 2005, Region 9 collected air samples while EPA employees and contractors participated in typical recreational activities at the Clear Creek Management Area. The samples were collected from the breathing zone of individuals riding motorcycles and all-terrain vehicles (ATV), driving and riding in sports utility vehicles (SUV), hiking, camping, sleeping in a tent, fence building, and washing and vacuuming vehicles after use at CCMA. Air filter sample cassettes were placed on adult samplers to collect air samples representing the breathing zone heights of both adults and children and samples were collected for both lead and trailing riders. These activity-based air samples were then analyzed for asbestos.

Q: What is activity-based sampling?

A: Activity-based sampling (ABS) samples the air in the breathing zone of an individual while that individual participates in typical work or recreational activities. ABS utilizes personal air monitoring, which has been used for decades by industrial hygienists to measure personal exposures in workplace environments. It is well-suited for environmental asbestos exposure measurements, because it captures the asbestos in the personal dust cloud that is generated by activities which disturb asbestos-containing soils, making it a more accurate predictor of exposure than fixed, stationary monitors or soil samples. Activity-based sampling is being used by EPA to evaluate asbestos exposure at a variety of sites across the country and was used by BLM and University of California researchers in earlier investigations at the CCMA. EPA employees conducting the sampling wore small air pumps in backpacks with the filter intakes on the front of the body near the shoulder for the adult samples, and lower on the torso for child

samples. Depending on the activity, the sample pumps ran for 1 – 2 hours, and washing and vacuuming activities were ½ hour.

Q: What did EPA sample and how were the samples analyzed?

A: EPA sampled for asbestos minerals. There are two families of asbestos minerals, the serpentine family and the amphibole family. Most of the asbestos found at CCMA is chrysotile, a member of the serpentine family, but EPA also found tremolite, actinolite, and other members of the amphibole family. Asbestos derived from these minerals has been associated with asbestos related disease. The analytical method used for the air samples, the International Organization for Standardization (ISO) Method 10312, is a state-of-the-art transmission electron microscopy method for asbestos the allows the analyst to measure every fiber seen under the microscope and also identify its mineral composition. EPA then used the fibers of the size classification known as phase contrast microscopy equivalent, or PCME, in its exposure and risk assessment.

Q: What is a PCME fiber?

A: Phased Contract Microscopy (PCM) is the analytical method for asbestos used in occupational environments. Current health standards for asbestos are based on studies which document the adverse health effects from asbestos exposure in workers. Since the worker exposures used PCM, the health standards are presented for the fibers which are counted in PCM. The standard methodology in PCM defines fibers as particles with a 3:1 length to width aspect ratio or greater and more than 5 microns long. Additionally, the resolution of the PCM equipment, which magnified a fiber on the air filter about 400 times, did not allow fibers thinner than 0.25 microns to be seen. Today, the EPA uses an analytical technique, Transmission Electron Microscopy or TEM, which magnifies fibers on the sample filters 10,000 to 20,000 times and can see much smaller and thinner fibers, as well as distinguish the mineral type of fiber. Thus, TEM analysis will find more fibers than PCM. In order to apply the current health standards to fibers when using a TEM analysis, the EPA counts only those fibers which would have been seen in the PCM method and an equivalent count of fibers is called the PCME. For this risk assessment, only those fibers which are >5 microns in length, have at least a 3:1 aspect ratio, and a diameter between 0.25 microns and 3 microns inclusive are considered. It is this PCME count which is used in the risk assessment, even though TEM was the analytical method used by EPA for measuring asbestos in the air samples for this assessment.

Q: Why is EPA concerned about the asbestos at CCMA? Isn't the asbestos natural to the area?

A: Yes, all asbestos is "natural". Although a natural mineral, asbestos can have adverse health effects. Asbestos is a known human carcinogen, and is recognized as such by EPA, the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Centers for Disease Control (CDC), California EPA, the World Health Organization, the International Agency for Research on Cancer (IARC) and numerous other international and national agencies. Asbestos is a group of naturally occurring fibrous minerals that have been mined for centuries for their unique physical properties such as tensile strength, ability to be woven, and heat and chemical

resistance. Three asbestos mines operated within or near the CCMA, supplying asbestos for a variety of commercial and industrial applications.

Q: Is it true that chrysotile asbestos is not dangerous?

A: No. Epidemiological studies of manufacturing workers clearly show that chrysotile exposure causes lung cancer and other debilitating and potentially fatal respiratory diseases such as asbestosis.[1,2] It is estimated that 96% of the asbestos used commercially was chrysotile asbestos.[3] Many of the epidemiological studies used in the Cal EPA and U.S. EPA health assessments considered workers exposed to chrysotile asbestos. Although amphibole asbestos was present in some workplaces and contributes to the risk estimates, the health effects of chrysotile asbestos cannot be set aside. Workers exposed to only chrysotile asbestos do have increased asbestos related diseases including lung cancer and asbestosis. The argument that chrysotile asbestos, like that seen at CCMA, is not hazardous is strongly contradicted by decades of epidemiological and public health study.

Q: Is it true that the chrysotile asbestos fibers found at CCMA are too short to cause disease?

A: No. Fibers of many different lengths have been detected in the air at CCMA. The EPA only counted those fibers greater than 5 microns in length as PCME fibers when calculating risk. However, the shorter fibers seen in the CCMA air filters were also present in the work environment on which the health standards are based. It is not known if shorter fibers can be considered without risk. A recent study by the U.S. National Institutes of Occupational Safety and Health (NIOSH) indicates that for chrysotile exposed textile workers, shorter fibers better correspond to the risk of asbestosis than longer fibers. Longer, thinner, fibers may be better associated with lung cancer. However, these findings do not define a limit to toxicity based on fiber dimension. There are a number of studies which support the view that shorter fibers cause disease.[1,4] Although the EPA unit risk is based on PCM fibers, short fibers were also present in the work environments, and their health effects, if any, are represented in the unit risk.

Q: Can only a few visits to CCMA a year be harmful?

A: EPA believes so, based on the high exposure concentrations we measured during some of the CCMA activities. However, this is an area of uncertainty because while we do know that the risk of developing disease increases with increased exposure concentration and duration, we do not know the precise frequency and duration of different asbestos exposures that are needed to cause disease.

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1 Hein MJ, Stayner LT, Lehman E, Dement JM. Follow-up study of chrysotile textile workers: cohort mortality and exposure-response. Occup Environ Med 2007; 64: 616-625

2 Yano E, Wang Z-M, Wang, X-R, Wang M-Z, Lan Y-J. Cancer Mortality among Workers Exposed to Amphibole-free Chrysotile Asbestos. American Journal of Epidemiology Vol. 154, No. 6: 538-543

3 Virta, R.L., 2005, Mineral commodity profiles—Asbestos: U.S. Geological Survey Circular 1255–KK, 56 p.

4 Dodson, R.F. (2003). Asbestos Fiber Length as Related to Potential Pathogenicity: A Critical Review. American Journal of Industrial Medicine 44:291–297.
http://www3.interscience.wiley.com/cgi-bin/fulltext/104553955/PDFSTART

Q: Is it safe to bring my children to CCMA?

A: This is a question that must be answered by parents. Increased asbestos exposure is believed to increase the risk of cancer for both children and adults. Children may be of special concern both because of their higher relative exposure, and the early lifetime exposure. When EPA put child height and adult height samplers on the same employee doing an activity, the asbestos concentrations on the child sample filter was greater than the adult filter about 64% of the time. This may be because the child breathing height is closer to the ground and closer to the asbestos-laden soil, and also because children tend to follow parent riders and intercept the lead rider dust cloud. Asbestos disease takes years or decades to develop. Children are of concern because their life expectancy exceeds the latency period for asbestos-related disease.

Q: CCMA has been open to OHV use for over 30 years. If the risk is so great, do you have evidence people have gotten sick or died because of their asbestos exposure at CCMA?

A: The type of study needed to determine if people have gotten sick or died has not been done. Generally these types of studies have been done for occupational, rather than recreational exposures. However, we do not want to wait until people get sick before we provide assistance that helps reduce exposure to a known human carcinogen.

Q: My family and I have been coming to CCMA for years. How can we tell if we've been exposed to asbestos?

A: You should discuss this with your personal physician. Unfortunately, there is no way to predict an individual's risk. Chest x-rays have been used as an indication of exposure in occupational settings. However, x-rays are not recommended for children and young adults. Information on asbestos testing is available in the Agency for Toxic Substances and Disease Registry (ATSDR) publication "Asbestos and Health: Frequently Asked Questions", http://www.atsdr.cdc.gov/noa/Asbestos-and%20Health.pdf, 1-888-42-ATSDR (1-888-422-8737).