Testimony for Senate Environment and Public Works Committee Hearing on the Health Effects of Asbestos
June 12, 2007
Dirksen Senate Office Building
Washington D.C.

Good Morning Senator Boxer and Members of the Committee

My name is Melanie Marty. I am a toxicologist in the California Environmental Protection Agency and I direct the Air Toxicology and Epidemiology Branch in the Office of Environmental Health Hazard Assessment, or OEHHA. We are the Cal/EPA department mandated to assess the health risks of exposure to chemicals in our environment. My testimony today focuses on naturally occurring asbestos, or NOA, in California, the assessment of potential health impacts from exposure, and ways California is addressing exposure to NOA.

Asbestos was identified as a Toxic Air Contaminant in 1986 in California, based on the evidence that asbestos causes asbestosis, lung cancer and mesothelioma in workers, and the ubiquitous presence of asbestos in urban air due to its widespread use in brake lining, building materials and so forth.

The health effects assessment conducted for the identification of asbestos as a Toxic Air Contaminant was based on studies of workers exposed to asbestos in a number of industrial settings (such as textile and other products manufacturing). We evaluated the relationship between extent of exposure to asbestos and subsequent development of asbestos-related disease in the workers, with a focus on the cancers caused by asbestos, in order to assess cancer risk from exposure to asbestos in ambient air.

The workers in the occupational studies we used in our risk assessments were exposed to mixed forms of asbestos ranging from relatively pure chrysotile to predominantly amphibole. Both types of asbestos are found naturally in the Sierra foothills, frequently together.

When asbestos fibers become airborne, they can be inhaled deep into the lung. While some are cleared by normal physiological processes, many fibers remain in the lung tissue forever. Inhaled asbestos fibers can migrate from the lung to the pleura (the lining of the chest wall), and can be transported to other organs as well.

There is no question that asbestos is a human carcinogen, and it is classified as such by the International Agency for Research on Cancer, and the U.S. EPA. Asbestos is regulated as a human carcinogen by OSHA, as well as by many countries around the globe.

As you have heard from other witnesses, in occupational settings, chrysotile and amphibole asbestos exposure causes lung cancer and mesothelioma, a rare and fatal cancer of the lining of the chest wall and abdomen, and nonmalignant respiratory disease such as asbestosis. While many researchers consider the amphiboles to be substantially more potent than chrysotile in causing mesothelioma, all forms of asbestos can cause mesothelioma and are more or less equipotent in producing lung cancer, which accounts for a majority of asbestos-induced cancers. The disease that has been most well investigated in relation to exposures to naturally occurring asbestos is mesothelioma, in part because it is a rare cancer and strongly associated with asbestos exposure.

Although initial studies focused on workers, there are many studies that describe mesothelioma in people exposed as a result of the presence of asbestos in the soil in their communities in Greece, Turkey, New Caledonia, and China. Many but not all of the mesotheliomas in these populations were related to use of the amphibole-containing soils in the community in various ways. Further, some studies have shown elevated mesothelioma and lung cancers in populations in close proximity to mines or asbestos factories where predominantly chrysotile asbestos-containing products were made. I submitted a short bibliography of key papers (there are many more studies) regarding environmental exposures to asbestos and cancer as well as a copy of some of these papers for your information. While it is difficult to use these studies to develop quantitative estimates of risks that Californians may

face from naturally occurring asbestos, these studies heighten concerns about environmental exposures to asbestos.

I'd like to make a few comments on the difficulties of assessing risk from exposure to naturally-occurring asbestos present in the soil. The typical approach for assessing risk from environmental exposure to airborne carcinogens is to use long-term average concentrations of the carcinogen in the air in the calculation.

But in the case of naturally-occurring asbestos in the soil, the exposures of concern are primarily episodic short-term exposures to relatively high levels of asbestos occurring from activities that release soil-borne fibers into the air, for example, while driving down a dirt road, or playing in asbestos-contaminated soil. It is difficult to determine an average air concentration to use in the typical cancer risk assessment calculation. However, episodic exposures to asbestos are important, in view of the long time asbestos fibers can remain in the body and the cumulative nature of the injury and risk.

There is general concern among scientists about exposing children to any carcinogen. Children breathe more on a body weight basis and thus experience higher doses than an adult in the same setting. Cancer has a long latency between exposure and manifestation of the disease; this is particularly true with asbestos-induced mesothelioma where there appears to be a long average latency, on the order of 30 to 40 years in most cases. When exposure occurs during childhood, as opposed to adulthood, the risk

from carcinogens including asbestos is higher because there is more time to develop the disease.

Cal/EPA has tried to estimate risk from episodic exposures related to serpentine rock used for surfacing unpaved roads. The Agency conducted studies which measured asbestos fibers in the air after vehicles have driven down such roads. Any way one cuts the data, it is clear that asbestos fiber exposures are elevated, particularly very close to these roads, and the cancer risk is elevated as well. Further, USEPA Region 9 conducted activity-based sampling, measuring the airborne fibers released by soil-disturbing activities including playing baseball, riding a mountain bike or running along an unpaved trail. These measurements clearly indicate that activities that disturb the soil result in locally elevated asbestos fiber concentrations.

I would like to touch briefly on some of the mitigation measures that have been put in place in California. The California ARB promulgated an airborne toxic control measure designed to reduce the allowable level of asbestos in aggregate and other materials used for surfacing unpaved roads. The local Air Pollution Control Districts in areas with asbestos in the soil have adopted measures to reduce dust generation during construction and grading activities. The Dept of Toxic Substances Control as part of its mandate to ensure that school sites are safe to build on, evaluates sites for the presence of asbestos in the soil, and requires mitigation and maintenance of such sites to reduce as much as is practicable the exposure of children attending these schools. In addition, there has been an effort by ARB and

the local air districts to educate citizens on the presence of and dangers of asbestos in the soil, and on ways they can reduce their exposures. Information including fact sheets on these activities have been submitted for your review. And finally, we have been actively working with USEPA Region 9 to evaluate exposures and risk and provide information to the public in El Dorado County about asbestos in their soil.

In closing, many studies have found mesothelioma, lung cancer, and pleural abnormalities in populations exposed to naturally occurring asbestos. The presence of asbestos fibers in soil can pose elevated risks of cancer (above background asbestos risks) when the fibers are released into the air from activities that disturb the soils. Construction activities, driving on unpaved roads surfaced with asbestos-containing rock, and other activities that people do (including sports) can elevate the concentration of airborne fibers in the immediate vicinity and expose individuals engaged in those activities to elevated fiber levels. These episodic exposures are important and increase the risk of asbestos-induced cancers to a level that is of regulatory concern. Finally, mitigation measures are necessary to reduce exposures to NOA.

Thank you for the opportunity to testify.

Senate Environmental and Public Works Committee hearing on health effects of asbestos.
June 12, 2007

**Some Key References for Cancer from Environmental Exposures to Asbestos**

Berry M. (1997) Mesothelioma incidence and community asbestos exposure. Environ Res 75:34-40.

Horton K et al. (2006) A review of the Federal Governmen's Health Activities in Response to Asbestos-Contaminated ore found in Libby, Montana. Inhalation Toxicol 18: 925-40.

Luce D et al. (2000) Environmental exposure to tremolite and respiratory cancer in New Caledonia: A case-control study. Am J Epidem151:259-65.

Luo S, et al. (2003) Asbestos related diseases from environmental exposure to crocidolite in Da-yao, China. I. Review of exposure and epidemiological data. Occup Environ Med 60:35-42.

Magnani C et al. (1995) Pleural malignant mesothelioma and non-occupational exposure to asbestos in Casale Monferrato, Italy. Occup Environ Med 52:362-7.

Maule MM, et al. (2007) Modeling mesothelioma risk associated with asbestos exposure. Environ Health Perspect. Doi:10.1289/ehp.9900 (available at http://dx.doi.org/) online March 22, 2007.

Metintas S, et al. (2002) Malignant mesothelioma due to environmental exposure to asbestos:Folow-up of a Turkish cohort living in a rural area. Chest 122:2224-9.

Paoletti L et al. (2000) Unusually high incidence of malignant pleural mesothelioma in a town of Eastern Sicily: An epidemiological and environmental study. 55:392-8.

Sakellariou K et al. (1996) Malignant pleural mesothelioma from nonoccupational asbestos exposure in Metsovo (north-west Greece): slow end of an epidemic? Eur Respir L 9:1206-10.

Smith A and Wright C. (1996) Chrysotile asbestos is the main cause of pleural mesothelioma. Am J Ind Med 30:252-66.

# Materials provided to Senate Environment and Public Works for June 12 hearing on asbestos health effects.
# California government web sites related to naturally occurring asbestos

1. The California EPA, Air Resources Board has a number of fact sheets and posted documents related to the identification of asbestos as a Toxic Air Contaminant and the presence of asbestos in California soils:

http://www.arb.ca.gov/toxics/asbestos/asblinks.htm

http://www.arb.ca.gov/toxics/asbestos/asbestos.htm

The following provides a link to the 1986 health effects assessment for asbestos as a Toxic Air Contaminant:
http://www.arb.ca.gov/toxics/id/summary/summary.htm

2. The California EPA, Office of Environmental Health Hazard Assessment has a fact sheet on asbestos health hazards:
http://www.consrv.ca.gov/cgs/minerals/hazardous_minerals/asbestos/index.htm

3. The California EPA, Department of Toxic Substances control school site assessment program evaluates school sites for presence of naturally occurring asbestos as part of their program to ensure adequate protection of public health at schools. They have several documents regarding activities to reduce exposure located at the following link:

http://www.dtsc.ca.gov/Schools/index.cfm#Environmental_Advisories_and_Guidance

4. The California Geological Survey web site contains numerous publications regarding the presence of asbestos in California soils including maps of various areas with known asbestos in the soil.:

http://www.consrv.ca.gov/cgs/minerals/hazardous_minerals/asbestos/index.htm