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Managing the New Asbestos Risks: Amphiboles Minerals and Soils

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Introduction

Asbestos is a generic name given to the fibrous variety of six naturally occurring minerals that were mined and commonly used in commercial products. Asbestos is actually the name of six regulated fibrous minerals that have been found to be carcinogenic and disease causing. The most common of these regulated asbestos mineral, chrysotile, is the only serpentine form of the asbestos mineral. Chrysotile asbestos accounts for about 95% of materials which are classified as asbestos-containing. The remaining five regulated forms of the asbestos minerals fall into the amphibole mineral family. Asbestos is made up of fiber bundles. These bundles, in turn, are composed of long and thin fibers that can be easily separated from one another. Naturally-occurring asbestos (asbestos that occurs in its natural geologic environment as opposed to sites where asbestos products have been concentrated by human activities) has recently become the focus of concern and attention from the public health community, due to the potential exposures that may result if the asbestos-bearing rocks are disturbed by natural erosion or human activities.

The federal government has acknowledged that a "safe level" of asbestos exposure has not been established. Federal regulations define an asbestos-containing material as containing more than 1% of any of the six regulated asbestos minerals. However, new scientific evidence has found that materials containing 1% or less asbestos or other fibrous amphibole minerals can still pose a significant risk to human health. Recent government research has determined that the rarer amphibole forms of the asbestos mineral appear to be significantly more toxic to human health than the more common chrysotile asbestos. The increase in toxicity is also being found in nearly 90 additional non-asbestos form minerals which are not regulated. The current USEPA Integrated Risk Information System (IRIS) for evaluating toxicity of potential asbestos exposures is outdated (1993) and does not account for the increased toxicity of amphibole minerals. The 15 year old method is no longer supported by valid science and has been under official scientific review by the USEPA for over seven years. The scientific uncertainty regarding this newly identified amphibole mineral health risk is reopening the asbestos debate and may well result in expansion

of existing regulations, increased health risks to workers, and never-ending liabilities well into the future.

This presentation will examine how the heightened toxicity of naturally occurring amphibole minerals (along with the spreading of man-made amphibole contamination) have created the need for: 1) new risk models and testing methodologies, 2) elevated concerns for worker and public health, 3) the need for revised asbestos regulations that are protective of worker health, 4) the need for new regulations which address worker and public exposures to amphibole minerals, and 5) awareness of emerging low level (<1%) asbestos and other fibrous amphibole mineral related liabilities.

Naturally Occurring Asbestos Naturally Occurs

Most asbestos regulations address the presence of the mineral in building products. Very few regulations apply to naturally occurring asbestos. Asbestos naturally occurs throughout the United States.

Libby, Montana and Contaminated Vermiculite from Zonolite Mountain.
Vermiculite mining in and near the town of Libby, Montana began in the 1920s and was continued by the W.R. Grace Company from 1963 until 1990. The vermiculite ore mined in Libby was contaminated with tremolite asbestos. Vermiculite is a naturally occurring mineral and the largest known deposit in the world is in Libby. It has been estimated that before the closing of the mine in 1990, Libby contributed up to 80% of the world's supply of vermiculite. It is a unique mineral with the ability to exfoliate, or expand, upon heating. Exfoliated vermiculite has many commercial uses such as inclusion in concrete aggregates, loose-fill insulation, horticultural applications like soil conditioning, and as a bulk carrier for agricultural chemicals.

The vermiculite from the mine was found to be contaminated with asbestos and other amphibole minerals. Workers were allowed to leave the mine site covered in asbestos dust, residents were allowed to take waste vermiculite for use in their gardens and the company distributing vermiculite "tailings" to the Libby schools for use as foundations for running tracks and an outdoor ice skating rink. The asbestos and amphibole fibers found in Libby have been linked to high incidence of asbestos related diseases in mine workers, vermiculite processing workers, their families, and the surrounding community. Health studies on residents of the Libby area show increased incidence of many types of asbestos related disease, including a rate of lung cancer that is 30 percent higher than expected when compared with rates in other areas of Montana and the United States. The EPA has spent over $180 million in asbestos cleanup costs in Libby, and it estimates that the total cost of cleanup in Libby will be well over $200 million. If, however, the information from its toxicological study finds that the previous cleanup levels have not been sufficient to significantly reduce health risks, these costs will likely increase dramatically.

Other Areas Also Contain Naturally Occurring Asbestos Minerals
Asbestos can be found naturally in the air outdoors and in some drinkable water, including water from natural sources. Asbestos from natural geologic deposits is known as "Naturally Occurring Asbestos" (NOA). Many populated areas are in proximity to shallow, natural deposits which occur in 50 of 58 California counties and in 19 other U.S. states. Portions of El Dorado county, -

Sidebar 1:
Background Information on Vermiculite and Zonolite from USEPA Region 8

Vermiculite is a silver-gold to gray-brown mineral that is flat and shiny in its natural state and puffed and dull in its expanded shape. It was discovered near Libby in 1881. In 1919, Dr. Edward Alley found that vermiculite expanded (or "popped") when heated. This created pockets of air that made the material suitable for use as insulation or as a soil amendment. Dr. Alley founded the Zonolite Company and developed the mine and processing facility north of Libby, producing expanded vermiculite as Zonolite. Zonolite was lightweight, sturdy, and inexpensive. It was used in everything from construction to school craft projects.

Exhibit 1. Magnified View of Vermiculite

It is estimated that the Libby mine was the source of over 70 percent of all vermiculite sold in the U.S. from 1919 to 1990; and, over its lifetime, it employed more than 1,900 people. W. R. Grace bought the mine and processing facility in 1963 and operated it until 1990.
The asbestos veins in the ore body have contaminated most, if not all, of the material taken from the mine. Milling removed much of the asbestos from the finished product, but a significant amount remained. Because asbestos fibers are so small, this contamination is not evident with the naked eye.

Not all vermiculite is contaminated. However, it is difficult to distinguish Libby vermiculite with the naked eye, and all vermiculite should be handled with care.

California are known to contain natural asbestos formations near the surface. The United States Geological Survey (USGS) studied amphiboles in rock and soil in the area in response to an EPA sampling study and subsequent criticism of the EPA study. The study found that many amphibole

particles in the area meet the counting rule criteria used by the EPA for chemical and morphological limits, but do not meet morphological requirements for commercial-grade asbestos. The executive summary pointed out that even particles that do not meet requirements for commercial-grade-asbestos may be a health threat and suggested a collaborative research effort to assess health risks associated with "Naturally Occurring Asbestos".

Large portions of Fairfax County, Virginia were also found to be underlain with tremolite. The county regulates the disturbance of these asbestos-contaminated soils. Iron mining tailings in Minnesota were also found to contain naturally occurring asbestos. Large quantities of these tailings were transported out of state and used as roadway base for super highways. The USGS has 331 natural asbestos occurrences of many sizes in the Eastern United States, using descriptions found in the geologic literature. These asbestos occurrences range in size from small veins to large ore bodies once mined for commercial and industrial uses. The mapping is being completed for the midwest and western portions of the United States.

Existing Asbestos Regulations Not Protective of Health

Occupational exposure to asbestos promulgated regulations to control asbestos emissions into the environment and reduce occupational exposures during the early 1970's into the mid-1990's. Certain fibrous forms of the serpentine (chrysotile) and amphibole (amosite, crocidolite, actinolite, anthopolite, and tremolite) asbestos mineral found in concentrations over 1% asbestos were regulated by the USEPA and OSHA. Most states and local regulatory agencies also adopted the 1% threshold for regulating asbestos in materials. In general, materials found to contain one percent asbestos or less are typically not subject to a majority of these regulatory bodies (see sidebar 1 for an OSHA clarification on materials containing <1% asbestos). However, neither the definition of an asbestos-containing material (ACM) nor the OSHA asbestos worker exposure levels of 0.1 fibers per cubic centimeter (f/cc) are protective of human health.

OSHA Admits Asbestos Exposure Limits Not Considered Safe

Air monitoring is used to evaluate compliance with OSHA's asbestos exposure limits. A low volume air pump with an air monitoring cassette is placed near the worker's breathing zone to simulate airborne asbestos levels if the worker did not have on a respirator. This analytical method does not count all asbestos fibers workers are exposed to during work involving asbestos disturbance. OSHA only requires that employers count regulated fibers. Regulated fibers are defined as being >5 microns in length with a 3:1 length to width ratio. This analytical method is also limited in that it does not just count asbestos, but all other fibers meeting this criterion.

OSHA found that significant risk remained at their 8-hour time weighted permissible exposure limit (PEL) of 0.1 f/cc. They found that lower levels of occupational exposure could be feasibly achieved. OSHA did not set a lower PEL when their standards were revised in 1994 and 1995 because lower levels of asbestos could not be reliably measured under workplace conditions. Instead of establishing a lower PEL, OSHA took a different approach to reducing the risk that remained at the existing PEL of 0.1 f/cc. It mandated that employers who engage in operations that can generate airborne asbestos follow specific work practices, such as wetting the asbestos and using HEPA vacuums to clean up dust and debris, to minimize the release of asbestos fibers. The standards also require employers to take certain other precautions, such as training employees who work with or near asbestos and using respirators during certain operations, which

will further reduce the risk to employees. In their 1994 preamble to the revised asbestos standards OSHA stated, *"There would be remaining risk at this new 0.1 f/cc exposure limit if there were not other provisions to these standards. However, the exposure limit is accompanied by mandated work practice controls and requirements for hazard communication, training and other provisions. Together these will very substantially reduce that remaining significant risk, although the exact amount of that reduction cannot be quantified. In addition, it would be difficult to measure accurately in the industrial setting levels lower than those in these standards. OSHA believes its approach of setting a PEL which is reliably measurable, yet, imposing work practices and ancillary provisions for operations regardless of measured fiber levels will result in risk reduction well below that expected from just enforcing the 0.1 f/cc PEL* (59 FR 40981-82; Aug. 10, 1994). Therefore, the OSHA PEL by itself is admittedly not protective of health. These findings also apply to non-occupational asbestos exposures where public safety is often times measured and defined as being in compliance with the non-protective OSHA PEL's.

Sidebar 2:
OSHA Clarificatio non Materials Containing <1% Asbestos

The OSHA asbestos standard contains numerous work practice requirements and prohibitions which apply, regardless of the exposure levels. However, only two of the requirements and three of the prohibitions must be observed in the case of work activities involving installed construction materials that do not contain >1% asbestos. Those work practice requirements and prohibitions that must be observed regardless of the exposure levels and of the percentage of asbestos in the installed construction materials are:
29 CFR 1926.1101(g)(1)(ii), which requires: wet methods, or wetting agents, to control employee exposures during asbestos disturbance and cleanup;

29 CFR 1926.1101(g)(1)(iii), which requires: prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers except in roofing operations, where the procedures specified in paragraph (g)(8)(ii) ;

29 CFR 1926.1101(g)(3)(i), which prohibits: high-speed abrasive disc saws not equipped with point-of-cut ventilator or enclosures with HEPA filtered exhaust air;

29 CFR 1926.1101(g)(3)(ii), which prohibits: compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud; and

29 CFR 1926.1101(g)(3)(iv), which prohibits: employee rotation as a means of reducing employee exposure to asbestos.

There are also some other provisions that apply to work activities involving installed construction materials even where the material does not contain >1% asbestos. However, if neither asbestos PEL is exceeded, only the following few provisions apply:

29 CFR 1926.1101(f)(2)(i), the provision for establishing that neither asbestos PEL is exceeded: Each employer who has a workplace or work operation covered by this standard shall ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during that operation or workplace.;

29 CFR 1926.1101(f)(6)(i), a provision covering the observation of monitoring: The employer shall provide affected employees and their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with this section;

29 CFR 1926.1101(f)(5)(i), a provision covering employee notification of monitoring results: The employer shall notify affected employees of the monitoring results that represent that employee's exposure as soon as possible following receipt of monitoring results;

29 CFR 1926.1101(f)(5)(ii), another provision covering employee notification of monitoring results: The employer shall notify affected employees of the results of monitoring representing the employee's exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees; and
29 CFR 1926.1101(n)(2)(i)-(iii), a set of provisions covering recordkeeping for measurements of exposures to airborne asbestos.

There are numerous additional provisions of the standard that apply to work activities involving installed construction materials even where the material does not contain >1% asbestos if at least one of the asbestos PELs is exceeded.

EPA Asbestos Standards Also Not Protective of Health

The National Emission Standards for Hazardous Air Pollutants (NESHAP), under the Clean Air Act, defines an asbestos containing material (ACM) to contain more than 1% asbestos. NESHAP primarily establishes work practices to minimize the release of fibers during processing, handling, and disposal of asbestos and asbestos containing material while renovating or demolishing structures. It is important to note that the NESHAP designation of ACM at 1% is not considered a health-based standard in that materials containing less than 1% asbestos may still pose some health risk when disturbed. Other than mined materials, NESHAP does not apply to naturally occurring asbestos.

The USEPA defines asbestos-containing materials as containing more than 1% asbestos at Superfund sites where soils are contaminated with asbestos. There is no regulatory requirement to address materials containing 1% asbestos or less. However, according to the EPA, W.R. Grace performed health evaluations of workers mining and processing asbestos contaminated vermiculite at Libby, Montana in the 1980's and found elevated health risks. The EPA recently indicted W.R. Grace and seven of its former executives in February 2005 "for knowingly endangering residents of Libby, Montana, and concealing information about the health effects of its asbestos mining operations" (U.S. Department of Justice press release, Feb. 8, 2005). Libby Montana has asbestos disease rates nearly 80 times the national average. Failure to address asbestos in quantities at 1% or less asbestos not only affected the corporation, it personally affected its corporate executives who allegedly had knowledge of these health risks, but failed to act. These findings has had significant impact lately when addressing asbestos issues as they apply to asbestos contaminated soils and products. The USEPA had always used the 1% threshold of asbestos in soil to determine if clean-up was necessary or if clean-up was complete at Superfund sites. However, an August 2004 memorandum from the USEPA Office of Superfund Remediation stated that one "*should not assume materials containing less than 1% asbestos do not pose an unreasonable risk to human health*". This memo went on further to state that "*The 1 percent threshold is not risk-based and an accurate exposure value could only be determined through site sampling techniques that generate fibers from soil and bulk samples. Therefore, we recommend the development of risk-based, site-specific action levels to determine if response actions for asbestos in soil/debris should be undertaken*". The EPA recommends using risk based testing in lieu of a 1% threshold to protect human health from materials containing less than 1% asbestos.

The EPA found elevated health risks in materials containing less than 1% asbestos and applied this new knowledge in a Superfund asbestos clean-up guidance issued in 2004. This new EPA guidance was developed because of government studies that took place at Libby, Montana, where vermiculite was contaminated with asbestos fibers and other fibrous amphibole minerals during the mining process. The August 2004 EPA Superfund memo stated, "*Recent data from the Libby site and other sites provide evidence that soil/debris containing significantly less than 1 percent asbestos can release unacceptable air concentrations of all types of asbestos fibers (i.e., serpentine/chrysotile and amphibole/tremolite). The most critical determining factors in the level of airborne concentrations are the degree of disturbance, which is associated with the level of activity occurring on the site, and the presence of complete exposure pathways*". Again, EPA established that soil/materials containing less than 1% asbestos should undergo risk assessments that evaluate airborne exposures during activities that lead to exposure pathways. Unfortunately, there are no peer reviewed, site specific, activity based asbestos risk assessments available to evaluate health risks for materials containing less than 1% asbestos

New Guidance is not Mandatory and is Selectively Applied by EPA

The EPA is using this knowledge about low-level asbestos and other fibrous amphiboles clean-up objectives in select situations while ignoring it in other circumstances. The EPA estimates that 15 to 35 million homes had this vermiculite insulation (Zonolite) blown in their attic spaces. The zonolite rarely contains over 1% asbestos and is therefore not regulated by the EPA. If this product is linked to adverse occupational health effects during mining and processing, what are the non-occupational risks to families with zonolite in a residential home? What are the health risks to the neighborhood if the home is demolished? The biggest omission of this knowledge occurred immediately after September 11, 2001 when asbestos contaminated dust and debris

found outdoors at the World Trade Center collapse was found to be safe by the USEPA based upon it containing less than 1% asbestos, even though the EPA had knowledge of the Libby health risk reports. The EPA estimates that the World Trade Center buildings contained approximately 400 tons of asbestos.

Risks of Naturally Occurring Asbestos and Other Amphiboles

The regulated definition of asbestos is restricted to the six commercially important asbestos minerals. The term asbestos provides no protection from exposure to fibers from other fibrous silicate minerals with structures and chemical compositions similar to fibers from asbestos minerals and has demonstrated health effects in exposed workers (or can reasonably be predicted to produce health effects).

What a Risk Assessment is and isn't

A risk assessment is a qualitative or quantitative evaluation of the environmental and/or health risk resulting from exposure to asbestos by combining exposure assessment results with toxicity assessment results to estimate risk. Risk assessments have been performed by the National Academy of Sciences (NAS), OSHA, CPSC, EPA and ATSDR over the years in support of regulatory activities or research. The risk assessment area is controversial. Much of the controversy may stem from uncertainties in the source data on which the assessments are based. The long latency period between exposure and onset of disease makes linking exposure concentrations, frequency, and duration to disease difficult.

The term "risk assessment" has been used when discussing the management of asbestos in buildings and in considering asbestos in products. Often it is erroneously referred to as an "exposure assessment" or "hazard assessment." Exposure assessments are performed to measure airborne concentrations of asbestos. Hazard assessments look at current exposures and the potential for future exposures. Building owners use this information to develop asbestos management plans to reduce or minimize actual exposures in an attempt to reduce or minimize actual risk.

The degree of risk posed by asbestos and other fibrous amphibole minerals is a controversial subject. With these forms of mineral fibers, factual variables such as the specific form of the material and exposure pathways can vary widely, and oversimplification of risk characterization can be problematic. Here are a few examples posed by the EPA:

- If it is assumed that any increase in exposure represents some increase in risk, should all exposures be eliminated?
- Since some low exposure is present in the outside air, should only additional exposure be eliminated?
- Is there some level of increased exposure, and a corresponding increase in frequency or severity of disease that is considered "acceptable?"

Other Fibrous Amphibole Minerals and Carbon Nanotubes: The New Asbestos?

Several issues have been raised by the scientific community about the minerals covered by this limited regulatory definition. The first issue is whether other fibrous minerals including amphiboles and zeolites should also be included in the definition of asbestos. The second issue

involves whether to include fiber-like cleavage fragments of non-regulated nonasbestiform amphiboles. The final issue addresses whether the specified dimensional (length and width) criteria for fibers is appropriate based upon new scientific evidence. NIOSH has historically maintained there is a scientific basis to assume that various fibers with dimensions and biopersistence similar to fibers from the traditional six asbestos minerals will have similar potential for causing respiratory diseases (e.g., cancer and fibrosis). Biopersistence is the ability of a fiber to lodge or "persist" in the lung, even though it is subject to the physiological clearance mechanisms of the lungs and environmental conditions. NIOSH is now extending these precautionary toxicological assumptions to man-made fibers such as carbon nanotubes.

New Research Initiatives Attempt to Define Asbestos Risks

Results from fiber toxicity research may impact both occupational as well as environmental health policies and practices. Many of the exposure issues that are important in the workplace are also important to communities and to public health. Therefore, the Federal government intends to pursue collaborative partnerships between federal, state, and private entities that would benefit from such research. Players in the partnerships will include the National Institute of Occupational Safety and Health, the Agency for Toxic Substances and Disease Registry (ATSDR), the Consumer Product Safety Commission (CPSC), the Environmental Protection Agency (EPA), the Mine Safety and Health Administration (MSHA), the National Institute of Standards and Technology (NIST), the National Institute of Environmental Health Sciences (NIEHS), the National Toxicology Program (NTP), the Occupational Safety and Health Administration (OSHA), and the United States Geological Survey (USGS), as well as with labor, industry, academia, practitioners and other interested parties. The intent of these partnerships will help to focus the scope of the research that can contribute to the scientific understanding of asbestos and other mineral fibers, to fund and conduct the research activities, and to develop and disseminate educational materials describing results from the mineral fiber research and their implications for occupational and public health policies and practices. Currently there are major research studies being conducted by NIOSH and the USEPA.

NIOSH Defines What is Known, Unknown and Needed on Asbestos Risk Methodologies

To reduce the uncertainty and controversy concerning exposure assessment and health effects of asbestos and other mineral fibers, NIOSH has embarked on strategic research projects which are needed to update toxicology, epidemiology, exposure assessment, and analytical methods. It is the hope of NIOSH that the resulting science can inform other regulatory bodies on the potential development of new policies for asbestos and other mineral (and man-made) fibers with recommendations for exposure indices that more effectively protect workers' and the public's health. NIOSH researchers will require a significant investment of time, scientific talent, and resources from both NIOSH and its partners to make this scientific endeavor work. However, NIOSH acknowledges the importance of achieving their asbestos research goals *"because the occupational health protection policies that NIOSH recommends for asbestos and other mineral fibers must be based on the results of sound scientific research."*

Sidebar 3:
A History of the EPA's IRIS on Toxicology

The Integrated Risk Information System is a program in the Office of Research and Development's National Center for Environmental Assessment (NCEA).

1985: The Integrated Risk Information System (IRIS) was created by EPA to develop consensus opinions about the health effects that may result from chronic exposure to various substances in the environment, and to provide these opinions in a database accessible across the Agency. By providing a common source of health effects information, the intent was to help EPA programs reduce inconsistency in toxicity assessments.

1985 to 1995: IRIS consensus opinions on the health effects of substances were developed by the RfD/RfC Work Group and the Carcinogen Risk Assessment Verification Endeavor Work Group, or CRAVE. The consensus opinions were documented in IRIS Summaries. During this period, the importance of IRIS grew as regulatory programs in EPA and states came to rely on IRIS information in decision making.

1995-1997: EPA conducted an IRIS pilot program to incorporate new operational procedures, the development of a Toxicological Review support document, the introduction of a process for incorporating peer review into the IRIS review process, and a revised consensus review process consisting of a standing group of senior health scientists representing the Program Offices and Regions in the review of all health assessments.

1997- Present: The IRIS database was uploaded to the Internet. Outreach to IRIS users was improved through an updated IRIS Hotline service. Opportunities for public involvement were provided through annual solicitation (via Federal Register notice) for submission of scientific information relevant to new chemical assessments, and through posting external review drafts of IRIS assessments on EPA's web site and consideration of public comments.

EPA Updating IRIS Risk Data on Asbestos

The USEPA has been reviewing the existing IRIS for asbestos that was last updated in 1993. The data was officially put under review in early 2001. On November 22, 2002, a draft was developed. In April of 2007 the draft was actually completed. The new draft is slowly undergoing review by the USEPA. One stumbling block has been the selection of an independent external peer review panel to review the draft. As it stands, the draft still must go through an agency review, interagency review, and an external peer review. No dates have been committed to by the EPA for completing the revised IRIS.

EPA Conducts Several Studies on Libby Naturally Occurring Asbestos-Contamination

In January 2007, EPA convened a group of more than 30 scientists from EPA, ATSDR, and the National Toxicology Program to identify data gaps and recommend additional studies on asbestos toxicology and risk. According to EPA, a Libby Asbestos Action Plan initiated at this meeting includes recommendations for 12 additional studies for asbestos-contaminated vermiculite. Detailed work plans for five of these studies have been completed with consultation from other

agencies and external peer reviewers. Two other studies are continuations of ongoing efforts. Detailed work plans for the remaining five studies are currently being finalized. All studies are scheduled to be completed by the end of calendar year 2009. The milestone date for completing the baseline risk assessment, including the comprehensive toxicity assessment, is the end of fiscal year 2010.

Evolving Science Discredits Protectiveness of Past Clean-ups

Recent investigations by the EPA's Office of Inspector General (OIG) in December, 2006, and the General Accounting Office (GAO) in October, 2007, revealed that the EPA, Centers for Disease Control (CDC), and other federal and state agencies had used sampling and analytical methods at most of the selected sites that have since been replaced by more accurate methods. After the EPA Office of Inspector General reported in December 2006 that EPA had not completed an assessment of the toxicity of the asbestos in Libby ore or the risks it posed, EPA initiated plans to do so by the end of fiscal year 2010. When the assessment is completed, EPA should be better able to determine if sites in Libby have been cleaned to safe levels, and whether any of the other 271 sites that received Libby ore may still pose a risk to public health and need to be re-evaluated.

<u>Protectiveness of Asbestos Superfund Clean-up In Libby, MT Questioned</u>
At the request of both Montana Senators, the Office of Inspector General (OIG) initiated a review of the U.S. Environmental Protection Agency's (EPA's) effort to clean up amphibole asbestos contamination in Libby, Montana in early 2006. In December, 2006 the OIG found that "*EPA has not completed a toxicity assessment of amphibole asbestos necessary to determine the safe level for human exposure; therefore, EPA cannot be sure that the Libby cleanup sufficiently reduces the risk that humans may become ill or, if ill already, get worse.*" The EPA's OIG recommended that Fund and execute a comprehensive amphibole asbestos toxicity assessment to determine:

- The effectiveness of the Libby removal actions
- Whether more actions are necessary.

The OIG went on to further recommend that the toxicity assessment should include the effects of asbestos exposure on children. They also recommended that the EPA Science Advisory Board should review the toxicity assessment and report to the Office of the Administrator and the Libby Community Advisory Group on whether the proposed toxicity assessment can sufficiently protect human health. Congress approved funding for this toxicity assessment study in 2007.

<u>2007 GAO Report Questions Nearly 300 Asbestos Health Evaluations by EPA</u>
In October, 2007, the Government Accounting Office issued a report regard nearly 300 sites where vermiculite contaminated with asbestos and other fibrous amphibole minerals from Libby, Montana was processed. The GAO found that since 2000, the EPA with assistance from the Centers for Disease Control's (CDC) Agency for Toxic Substance and Disease Registry (ATSDR) and state agencies had evaluated 271 sites thought to have received asbestos-contaminated ore from Libby, Montana, but did so without key information on safe exposure levels for asbestos. Based on these evaluations, 19 sites were found to be contaminated with

asbestos from the Libby ore and needed to be cleaned up. EPA or the state of jurisdiction generally led or oversaw the cleanups.

In general, a cleanup would be performed if sampling results indicated asbestos was present in amounts greater than 1 percent (based on the percentage area in a microscopic field) in soils or debris or greater than 0.1 asbestos fibers per cubic centimeter of air. However, these standards are not health-based and the Agency for Toxic Substances and Disease Registry found that the sampling and analysis methods EPA used at most of the sites it examined were limited and have since been improved. As discussed above, the EPA Office of Inspector General reported in December 2006 that EPA had not completed an assessment of the toxicity of the asbestos in the Libby ore. The GAO found that until it completes this assessment, EPA cannot be assured that the Libby site itself is cleaned to safe levels, nor will it know the extent to which the sites that received Libby ore may need to be reevaluated. EPA has agreed to complete a risk and toxicity assessment by the end of fiscal year 2010.

Is There Legal Liability with Other Fibrous Amphiboles?

The EPA has taken an aggressive stance on naturally occurring asbestos and other fibrous amphibole fibers in a few recent cases. In Libby, Montana, the EPA indicted W.R. Grace and several executive for allegedly knowingly exposing workers to vermiculite contaminated with naturally occurring asbestos and other fibrous amphibole minerals. In a second case, the EPA sought costs associated with evaluating and remediation of land in California which contained naturally occurring asbestos and other fibrous amphibole minerals. Both cases have the potential to set landmark precedence creating huge civil and criminal liabilities.

EPA Seeks Criminal Prosecution for Knowingly Selling Contaminated Products
In February, 2005, The United States Department of Justice and the Environmental Protection Agency announced that a federal grand jury in the District of Montana has indicted W.R. Grace and seven current and former Grace executives for knowingly endangering residents of Libby, Montana, and concealing information about the health effects of its asbestos mining operations. According to the Indictment, W.R. Grace and its executives, as far back as the 1970's, attempted to hide the fact that toxic asbestos was present in vermiculite products at the company's Libby, Montana plant. The grand jury charged the defendants with conspiring to conceal information about the hazardous nature of the company's asbestos contaminated vermiculite products, obstructing the government's clean-up efforts, and wire fraud.

According to the indictment, approximately 1,200 residents of Libby have been identified as suffering from some kind of asbestos-related abnormality. If convicted, the defendants face up to 15 years imprisonment on each endangerment charge, and up to five years imprisonment on each of the conspiracy and obstruction charges. W.R. Grace could face fines of up to twice the gain associated with its alleged misconduct or twice the losses suffered by victims. According to the indictment, W.R. Grace enjoyed at least $140 million in after-tax profits from its mining operations in Libby. W.R. Grace also could be ordered to pay restitution to victims. The trial is expected to move forward in the summer of 2008 pending an appeal currently in front of the U.S. Supreme Court.

EPA Claimed Public School was a Potentially Responsible Party in Asbestos Clean-up

The EPA recently completed a comprehensive investigation to assess the potential for exposure from naturally occurring asbestos in El Dorado County, California. In September 2003, the EPA received a petition under the Superfund Law (also known as CERCLA) to assess asbestos exposure at public areas in El Dorado Hills near Oak Ridge High School. The petition was prompted by discovery of asbestos in the soil at the high school, which was cleaned up by the EPA in August 2004. Since the EPA's action at Oak Ridge High was taken under the federal CERCLA, those responsible for pollution are required to pay cleanup costs whenever possible. Although the asbestos at Oak Ridge is naturally occurring, the contamination was on school property, so under CERCLA, the school could have been held liable for the EPA's costs. The EPA decided not to try to recover cleanup costs from the school after determining that it had no uncommitted funds to pay the government. The school has also spent $1.3 million on cleanup of asbestos contamination before the EPA's involvement.

Conclusion

Evolving science regarding the increased risk of asbestos and other fibrous amphibole minerals has significantly impacted current regulations and past risk assessments. New risk methodologies, analytical protocols, and testing methodologies are needed to address these new risks for protecting workers and the general public from naturally occurring and man-made asbestos pollution. Contamination of building materials and soils with these highly toxic fibrous minerals has created doubt over the protectiveness of past remediation efforts. There is also potential liability associated with a new wave of potential diseases and expanded remediation in areas contaminated with asbestos and other fibrous amphibole minerals. The SHE professional will benefit from keeping an eye out for new asbestos developments regarding worker safety and regulatory updates. Below you will find my own personal involvement with an asbestos-contamination case in Illinois that touches upon the points in my presentation.

Sidebar 4:
Asbestos Contamination in Illinois: My Story

For over five years, this session's presenter Jeff Camplin has been volunteering time evaluating the presence of visible and microscopic asbestos fibers along the Illinois Lake Michigan shoreline. In early 2003, I discovered asbestos debris along a beach at Illinois' most visited state park. Illinois Beach State Park, located in the farthest northeast corner of Illinois, borders Lake Michigan for 6.5 miles. An estimated two million visitors a year visit the park. A Johns-Manville (JM) asbestos Superfund site is situated at the south end of the park along with its 30 foot high, 130 acre asbestos waste pile that contains an estimated 3 million cubic yards of the hazardous material. Eight clean-ups have been performed outside of the JM Superfund site, including at Illinois Beach State Park.

Illinois Beach State Park has a long history of asbestos pollution. In the early 1990's, over 150,000 pounds of asbestos was quietly removed from a fishing beach at the south end of the park near the asbestos Superfund site. In 1995, asbestos-contaminated sediments just offshore of the asbestos Superfund site were dredged and dumped on the popular park beaches as beach replenishment sand. Additional sands were dredged and dumped on and offshore at the north end of the park at a "feeder beach" designed to feed sand to the 6.5 miles of shoreline to the south. By 1997, this "replenishment sand" fed so much asbestos debris along the public shorelines that the beaches were closed so the regulated waste could be removed. The area was reopened in 1998 when beach sand was found to contain less than 1% asbestos and air sampling detected trace amounts of asbestos.

Exhibit 2. New Beach Wear? EPA performs beach risk assessment.

In 2003, I evaluated these 1998 studies that were used to reopen the beaches. What I discovered was that air sampling used to claim the beaches were safe was performed in the cold, wet months of March when the beaches were partially frozen. One note on a March 1998 project log stated that snow was lightly falling during air testing. I also found that sands containing less then 1% asbestos still might be a risk to public health. In June, 2003, I authored a 25+ page study now recognized as the "Camplin report", concluding no risk-based studies had ever been conducted to verify the safety of the beaches. This fact, along with the continued daily appearance of weathered, friable, chunks of asbestos waste on the public beaches, compelled me to ask the State of Illinois to close the Park beaches.

In July, 2003, the Illinois Attorney General's office formed an asbestos task force to "look into the serious charges" brought forth by my Camplin report. The task force employed the University of Illinois at Chicago's (UIC) School of Public Health to perform a limited risk screen to determine if an airborne asbestos hazard was present at the beach. The $250,000+ study sampled beaches at Illinois Beach State Park, on and offshore of the feeder beach areas, offshore where dredging occurred, and at three background beaches in Wisconsin, Chicago, and north shore communities in Illinois. The sand from Illinois beach would be statistically compared to background locations to determine if beach sands were statistically elevated. The final report, issued in June 2005, found that "statistically elevated" concentrations of asbestos fibers were found on beach sands, the feeder beach, and just offshore of the feeder beach. Results also found that source of the dredged sand contained "statistically elevated" levels of asbestos, including the highly toxic amphibole asbestos. The most shocking finding was that "statistically elevated" levels of microscopic asbestos, specifically tremolite asbestos, were found in the highest concentrations at a background beach location in Chicago. Oak Street beach, located in the shadows of the John-Hancock building near Chicago's Magnificent Mile, contained the highest levels of asbestos contamination.

After reviewing this study I found that the UIC report conclusion that there was no elevated risk to airborne levels of asbestos, without taking any air samples! I quickly filed complaints to both the EPA and Centers for Disease Control (CDC). Both agencies concluded that actual air sampling was necessary to evaluate airborne risks to asbestos. In 2006, CDC's Agency for Toxic Substances and Disease Registry performed "activity-based" air testing, simulating asbestos exposures during common beach activities. Unfortunately the testing was performed prior to beach season in the cold, damp month of May immediately after 9 straight days of rain. Even under these conditions, significantly elevated levels of amphibole asbestos were found in the open beach air. A draft report was issued in May, 2007 which concluded that no elevated health risks were present and no further air sampling was necessary. I challenged these findings by filing an ethics complaint to the Department of Health and Human Services and USEPA's Inspector General. The EPA forwarded ATSDR's draft report to their prestigious ERT group which performs risk assessments on metals and asbestos.

In July, 2007, the local NBC affiliate ran a series of investigative reports into the asbestos contamination. The award winning investigative reporter Carol Marin featured me as the asbestos expert in her series. Ms. Marin was caught in the dust from the collapse of the World Trade Center and has a vested interest in the new risk-based studies on low level asbestos exposures.

The video clip from the first report was highlighted on the ASSE website for a week this July. The video clips and transcripts from the informative investigative reports can be accessed at http://www.nbc5.com/unit5investigates/13914521/detail.html

The EPA's TRW group found significant deficiencies in the draft ATSDR report in a memo released in August, 2007. Region 5 of USEPA hastily responded to the criticism by requesting a new round of "activity-based" testing to be performed by the EPA's Emergency Response Team (ERT) from Las Vegas. Approximately eight days of testing is currently being performed as this article is being written under the supervision of Brian Brass of the USEPA's ERT. I provided USEPA with recommendations for the activities he felt should be evaluated. I also had the opportunity to meet with the ERT team leader Brass after the first day of testing. The testing continued even though severe storms ripped through the area a few days into the project.

The EPA's Emergency Response Team selected activities such as volleyball, Frisbee tossing, sand castle building, and beach raking. They also incorporated my request to evaluate indoor areas such as Park maintenance garages, washrooms, and offices. Unfortunately, the ERT did not want to evaluate "take-home" contamination. I commented that, "Everyone who has ever been to a beach with their kids knows sand gets in their shoes, hair, and ears. Sand is carried home on people, pets, and their belongings where secondary exposures to the asbestos-contamination can occur. No one is looking at these secondary public take-home exposure scenarios". I have already called for additional and more comprehensive testing to be performed during the 2008 beach season of June through August. I also asked that new testing include other asbestos-contaminated beaches including Chicago's popular Oak Street beach located 35 miles to the south.

The current ERT study began with EPA staff and contractors playing a game of volleyball in full PPE. The first day temperatures were an unseasonable high 90° F. Heat was certainly a concern for the workers simulating the beach activities. Preliminary testing results from the activity-based testing, along with a full risk-based health evaluation report is expected in the late Spring of 2008.

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