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Report to the Honorable Denny Rehberg, House of Representatives

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HAZARDOUS MATERIALS

EPA's Cleanup of Asbestos in Libby, Montana, and Related Actions to Address Asbestos-Contaminated Materials

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GAO-03-469

April 2003

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Highlights

Highlights of GAO-03-469, a report to the Honorable Denny Rehberg, House of Representatives

HAZARDOUS MATERIALS

EPA's Cleanup of Asbestos in Libby, Montana, and Related Actions to Address Asbestos-Contaminated Materials

Why GAO Did This Study

Between 1979 and 1998, the number of deaths in Libby, Montana from asbestosis—a lung disease that progressively restricts breathing and can be fatal—was 40 to 80 times higher than the average for the United States. Vermiculite ore—containing high concentrations of asbestos—was mined at Libby between 1923 and 1990, and accounted for most of the world's vermiculite. Mining, processing, or any disturbance of the contaminated vermiculite releases asbestos fibers into the air, which can lead to respiratory illnesses, including asbestosis. When processed, the vermiculite is used in insulation, fireproofing materials, garden materials, and other products. GAO reviewed the history of the Environmental Protection Agency's (EPA) involvement in Libby prior to the agency's initiation of cleanup actions in 1999, the status and costs of EPA's cleanup in Libby, and other actions EPA and other federal agencies are taking to address exposure to asbestos-contaminated materials.

www.gao.gov/cgi-bin/getrpt?GAO-03-469.

To view the full report, including the scope and methodology, click on the link above. For more information, contact John Stephenson at (202) 512-3841 or stephensonj@gao.gov.

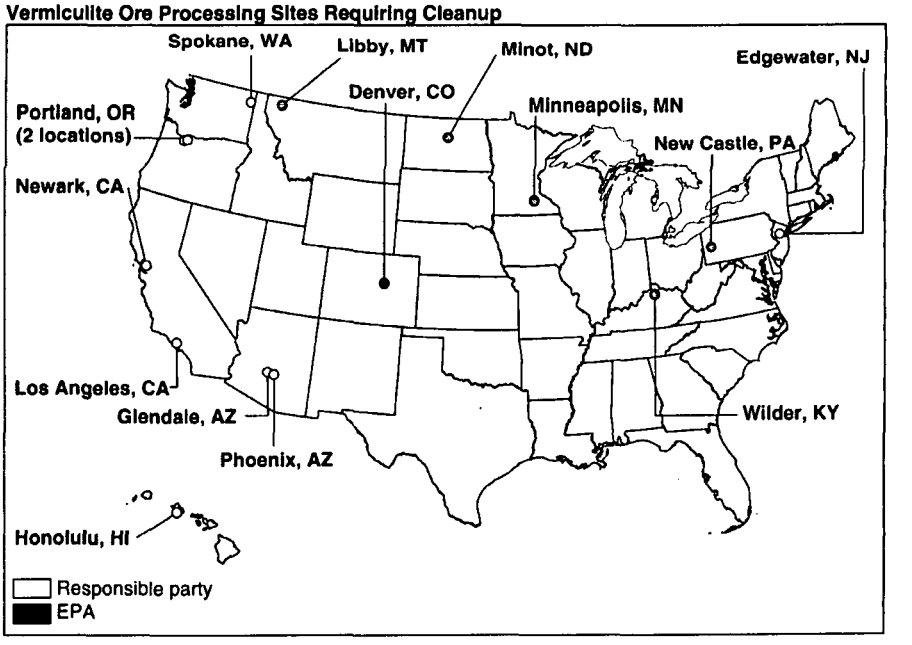
What GAO Found

EPA has had a long track record investigating and cleaning up asbestos contamination at Libby, Montana. As far back as 1982, EPA reported that Libby vermiculite ore processed to remove impurities remained contaminated with asbestos. Nonetheless, EPA misjudged the extent of contamination at Libby and focused instead on higher-priority asbestos contamination issues at other locations. Although EPA had received citizen complaints about potential health risks with this vermiculite ore since 1992, it did not initiate an extensive investigation until after the media reported about health problems in Libby in 1999.

Cleanup at Libby, begun in 2000, is expected to continue through 2007 and cost at least $179 million. Through 2002, EPA spent $79 million on cleaning commercial, residential, and public properties in Libby. Cleanup included sampling analyses, soil excavation and disposal, property restoration, and medical testing. EPA plans to spend another $100 million to complete cleanup activities at these properties and at the Libby mine.

While the Libby cleanup continues, EPA and agencies within the Departments of Labor and of Health and Human Services have activities addressing potential exposure to substances contaminated with asbestos. For example, EPA and responsible parties are conducting cleanup at 14 sites that received Libby vermiculite ore, in addition to Libby, as shown below.

Vermiculite Ore Processing Sites Requiring Cleanup



Source: EPA (data) and GAO (analysis).

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Abbreviations

ATSDR Agency for Toxic Substances and Disease Registry
EPA Environmental Protection Agency

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United States General Accounting Office
Washington, DC 20548

April 14, 2003

The Honorable Denny Rehberg
House of Representatives

Dear Mr. Rehberg:

Vermiculite ore mined near Libby, Montana, between 1923 and 1990 accounted for most of the world's vermiculite. This material was used in the manufacture of products such as building insulation, fireproofing materials, and gardening soil. The Libby vermiculite naturally contains high concentrations of asbestos, which, when released into the air, can cause serious respiratory illness that can lead to death. The Libby ore posed health risks at multiple sites: in Libby, when it was mined, crushed, and partially separated from other materials and then again when it was shipped and received at facilities around the nation for final processing. In addition, individuals could be exposed through other sources, such as workers' clothing. Overall, between 1979 and 1998, the number of deaths from asbestosis—a lung disease that progressively restricts breathing and can be fatal— was 40 to 80 times higher than expected in Libby, Montana, and, as of 2001, almost 18 percent of current or former Libby residents who received x-rays were identified as having asbestos-related lung abnormalities, according to the Department of Health and Human Services.

The Environmental Protection Agency (EPA) is cleaning up the Libby site and other sites at which individuals may have been exposed to Libby's asbestos-contaminated vermiculite. Under the Superfund program, created by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, EPA is authorized to clean up sites containing hazardous waste, including those that present an immediate threat to human health and the environment, such as Libby. EPA may compel the parties responsible for the contamination at a site to clean it up, or the agency may pay for the cleanup itself and later try to recover cleanup costs from the responsible parties. In addition, EPA and other federal agencies regulate asbestos under the Clean Air Act and other laws. The act allows EPA to delegate to the states responsibility for investigating hazardous air pollutants, such as asbestos.

As agreed with your office, we determined (1) the history of EPA's involvement in Libby, Montana prior to the agency's initiation of cleanup

actions in 1999; (2) the status and cost of EPA's cleanup in Libby; and (3) other actions EPA and other federal agencies are taking to address exposure to asbestos-contaminated materials.

Results in Brief

EPA has had a long track record investigating and cleaning up the extensive asbestos contamination in Libby, Montana. As far back as 1982, EPA reported that the Libby vermiculite ore, even after processing it to remove impurities, remained contaminated with asbestos. This report resulted from an investigation EPA had launched in 1978, after learning that workers at a vermiculite-processing plant in Marysville, Ohio—one of many sites across the country where Libby vermiculite was sent—were exhibiting symptoms of asbestos-related diseases. Nonetheless, EPA did not initiate action to address this contamination at the time because it misjudged the extent of contamination in Libby and focused on what it considered higher-priority asbestos contamination issues at other locations such as school buildings nationwide. Years later, in 1992 and 1994, EPA received citizen complaints about potential health risks from vermiculite at a former processing site in Libby. Under the authority delegated to it by EPA, the state of Montana investigated these complaints. According to EPA, the state investigation following the first complaint identified asbestos insulation inside one of the buildings at the site. The insulation was subsequently removed during the demolition of these buildings and EPA fined the owner of the mine for failing, among other things, to notify EPA, as required, of the presence of the insulation prior to the demolition. The state investigation following the second complaint identified asbestos-contaminated vermiculite at the site, but the state took no action because Clean Air Act regulations do not cover emissions from asbestos-contaminated ores such as vermiculite, which are processed for purposes other than extracting their asbestos content. In 1999, media reports called attention to health problems in Libby. These reports triggered a follow-up EPA investigation. Unlike previous investigations, however, this investigation was more extensive and identified widespread contamination. With this evidence, EPA launched a cleanup effort under its Superfund program.

Cleanup in Libby, begun in 2000, is expected to continue through at least 2007 and cost at least $179 million. This cleanup will include commercial, residential, and public properties within Libby, as well as the mine and adjacent sites. As of December 2002, EPA had spent approximately $79 million for activities such as sampling and analyses, soil excavation and disposal, property restoration, administrative costs, litigation costs to recover cleanup expenditures; and medical testing of current and former

Libby residents. EPA estimates that it will spend an additional $100 million to complete cleanup activities in Libby through 2007.

While the Libby cleanup continues, EPA and agencies within the Departments of Labor and of Health and Human Services are taking other actions to address potential exposure to substances contaminated with asbestos associated with vermiculite mined in Libby. For example, EPA has examined the extent of contamination at 173 sites nationwide that received Libby ore, and has planned, initiated, or completed cleanup at 5 sites at an estimated cost of over $7 million. EPA is also examining potential changes to existing laws and regulations. For example, EPA is considering whether to regulate emissions from materials that naturally contain asbestos, such as vermiculite. If EPA were to take this action, it could expand the scope of the emissions standards under the Clean Air Act that regulate asbestos. Currently, these standards apply only to asbestos used for commercial products and not to materials that naturally contain asbestos, such as vermiculite. Within the Department of Labor, the Mine Safety and Health Administration is investigating exposure to asbestos at different types of mines, including vermiculite mines, in order to decide on what actions should be taken to protect mine workers from overexposure to asbestos in mining facilities— an options paper is expected by April 2003. Two agencies within the Department of Health and Human Services are also examining the potential for exposure to asbestos-contaminated vermiculite. The Agency for Toxic Substances and Disease Registry (ATSDR) is examining potential exposures to Libby ore in communities identified by EPA, and expects to report its findings in 2004. The National Institute for Occupational Safety and Health is examining the potential for asbestos exposure at horticultural nurseries and vermiculite-processing plants that continue to receive vermiculite ore from mines other than Libby.

Background

Asbestos is a term used to describe a group of naturally occurring silicate minerals, six of which are regulated: actinolite, amosite, anthophyllite, chrysotile, crocidolite, and tremolite. Asbestos has several properties that made it commercially valuable. Its fibrous nature made it a good thermal and acoustic insulator and allowed manufacturers to weave it into cloth. Since asbestos is an inorganic mineral, it does not burn. Some applications and uses of asbestos are prohibited, such as certain flooring materials, but asbestos is still widely used in products such as cement pipes and disc brake pads on vehicles. The U.S. Geological Survey estimates that over 26 million pounds of asbestos was used in the United States during 2001. EPA estimated that more than 700,000 commercial and public buildings

and countless more homes, schools, and factories contain asbestos, most of which is chrysotile.

By the early 1900s asbestos was recognized as a cause of occupational disease. Initially, the disease associated with asbestos was asbestosis—a scarring of the lung tissue whose symptoms include a shortness of breath and can be fatal in advanced cases. During the 1930s and 1940s, the connection between asbestos exposure and lung cancer emerged. By 1960, the connection between mesothelioma and asbestos exposure was established. Mesothelioma is primarily a cancer of the mesothelial lining of the lungs. The asbestos-related diseases all have a long latency period between the initial exposure and the onset of disease. Asbestos-related maladies rarely occur in less than 10 years after first exposure.

The federal government regulates asbestos-related environmental contamination under two principal statutes, the Toxic Substances Control Act and the Clean Air Act. However, neither of these statutes specifically governs asbestos-contaminated ore, such as the vermiculite in Libby. Workers are protected from certain workplace asbestos-related hazards under the Occupational Safety and Health Act, and the Mine Safety Act. EPA is responsible for administering two of these statutes and the Department of Labor is responsible for the other two:

- Under the Toxic Substances Control Act, EPA regulates asbestos in schools and in asbestos abatement activities conducted by state and local governments, and has banned asbestos from certain products, such as certain types of flooring materials and paper products, and prohibits all new uses of asbestos.
- Under the authority of the Clean Air Act, EPA developed the National Emissions Standard for Hazardous Air Pollutants for asbestos that applies to, among other things, the manufacturing and milling of commercial asbestos, the demolition of structures containing asbestos materials, and puts restrictions on use of certain types of insulation. The standard does not regulate air emissions from asbestos contaminated ore such as that from Libby because it is not a commercial product.
- Under the Occupational Safety and Health Act, the Department of Labor's Occupational Safety and Health Administration regulates occupational exposure to airborne asbestos.
- Under the Federal Mine Safety and Health Act, the Department of Labor's Mine Safety and Health Administration regulates miners' exposure to airborne asbestos concentrations.

In addition, in 1980, the Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act, which established the Superfund program, to clean up highly contaminated hazardous waste sites. Under this program, EPA places hazardous waste sites it considers to be the Nation's worst on the National Priorities List. EPA administers the program, oversees cleanups performed by the parties responsible for contaminating the sites, and may also contract with other entities to perform the actual cleanup work. EPA may compel the responsible parties to clean up the sites, or the agency may pay for the cleanup from the Superfund trust fund and later try to recover cleanup costs from the responsible parties. EPA is seeking to recover its cleanup costs in Libby from the mine's owners and other potentially responsible parties.

The Superfund program has two basic types of cleanups: (1) removal actions, which mitigate immediate threats from hazardous waste sites that may or may not be on the National Priorities List, and (2) remedial actions, which are long-term cleanup actions. Only sites on the National Priorities List may receive Superfund financed remedial actions.

EPA Was Aware of Potential Health Risks Before 1999, but Other Factors, Including Higher Priorities, Prevented Action

As far back as 1982, EPA had reported that Libby vermiculite ore processed to remove impurities was contaminated with asbestos, but it did not initiate investigations leading to cleanup actions until 1999. According to EPA officials, they did not act prior to 1999 because they were unaware of the extent of contamination in Libby, and instead focused on what they considered to be higher priority asbestos contamination issues, such as asbestos contamination in schools and commercial buildings. Furthermore, although a 1992 state investigation of a former Libby processing plant found violations of a building demolition standard for asbestos, a 1994 state investigation concerning asbestos-contaminated vermiculite at the same site resulted in no enforcement action because Clean Air Act standards do not apply to asbestos-contaminated ores. In 1999, newspaper reports triggered an EPA investigation and the resulting cleanup.

EPA Investigated Potential Risk of Libby Vermiculite, but Focused on More Highly Contaminated Asbestos Products

In 1978, EPA learned that workers at a chemical fertilizer plant in Marysville, Ohio, were exhibiting symptoms of asbestos-related diseases.[1] The plant used vermiculite ore to produce fertilizer products, and the Libby vermiculite was believed to be the major source of asbestos at this plant. Relying on the health information provided by the Marysville company, EPA began to issue a series of reports on the potential risk of asbestos-contaminated vermiculite. Specifically:

- In June 1980, EPA reported that it needed to develop more information, such as the identification of all vermiculite mine sites, the processors for the vermiculite, the potential number of employees exposed to asbestos-contaminated vermiculite, and the products containing asbestos-contaminated vermiculite.[2]
- In February 1981, EPA provided a menu of options for regulatory actions for controlling asbestos-contaminated vermiculite, if further investigation showed that regulatory action was needed.[3]
- In August 1982, EPA concluded that there were significant adverse health effects associated with past occupational exposure to asbestos-contaminated vermiculite, probably through airborne fibers, at the Marysville plant.[4,5]
- In September 1982, EPA reported the results of its laboratory analysis of vermiculite samples taken at three major U.S. mines producing vermiculite, including Libby.[6]

Although the September 1982 report did not comment on the significance of the health risks, a 1983 EPA letter stated that the laboratory results

[1] Letter from O M Scott & Sons to U.S. Environmental Protection Agency, Office of Toxic Substances, and U.S. Department of Labor, Occupational Safety and Health Administration, December 5, 1978.

[2] U.S. Environmental Protection Agency. Office of Pesticides and Toxic Substances. *Priority Review Level 1—Asbestos-Contaminated Vermiculite.* Washington, D.C., June 1980.

[3] U.S. Environmental Protection Agency. Office of Toxic Substances. *Decision Paper for Asbestos-Contaminated Vermiculite.* Washington, D.C., February 1981.

[4] U.S. Environmental Protection Agency. Office of Toxic Substances. *Disposition Paper for Asbestos-Contaminated Vermiculite.* Washington, D.C., August 1982.

[5] The plant owners subsequently upgraded the plant's dust collection equipment to capture asbestos fibers, and a recent EPA investigation identified no asbestos on site.

[6] Midwest Research Institute, *Collection, Analysis and Characterization of Vermiculite Samples for Fiber Content and Asbestos Contamination*, a report prepared at the request of the U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances, Washington, D.C., September 27, 1982.

indicated asbestos fibers were less than 1 percent of ore processed to remove impurities; the memo also stated that EPA considered asbestos contaminated vermiculite as posing less risk than asbestos-containing materials in school buildings nationwide, and in commercial and industrial uses of asbestos.[7] Therefore, EPA shifted its focus to these other asbestos materials and products. We did not find any other documents referring to specific events, conversations, or policies that led to this decision. Moreover, we did not find any evidence that EPA officials were pressured to shift the agency's focus.

Despite this shift away from vermiculite, EPA continued to consider the issue of asbestos in vermiculite. In February 1985, EPA developed estimates of the level and range of exposure for workers and the general public who come into contact with asbestos-contaminated vermiculite, which it stated could be used for regulatory decision-making with further study.[8] In March 1987, EPA concluded that vermiculite was one of five materials that had a high possibility of containing asbestos.[9] In the following three years, EPA pursued steps to support regulation by carrying out such tasks as requesting information from industry about the health effects of asbestos found in other materials ("contaminant asbestos") and developed estimates of risk to human health.[10]

In 1991 EPA determined that the weight of evidence for asbestos-contaminated vermiculite was sufficient to show a causal relationship for increased lung cancer in miners and millers.[11] However, according to EPA, the agency did not conduct additional work on asbestos-contaminated vermiculite because it needed its resources to implement the 1990 Clean

[7] Letter from Acting Assistant Administrator, U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances to the Honorable James A. Courter, House of Representatives, June 8, 1983.

[8] Versar, Inc., *Exposure Assessment for Asbestos Contaminated Vermiculite*, a report prepared by the U.S. Environmental Protection Agency, Office of Toxic Substances, Washington, D.C., February 1985.

[9] The other materials were asbestos, pyrophyllite, stone, and talc.

[10] U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. *Asbestos in Earth Materials*. Research Triangle Park, North Carolina, March 1987.

[11] U.S. Environmental Protection Agency. Office of Research and Development. *Health Assessment Document for Vermiculite*. Research Triangle Park, North Carolina, September 1991.

Air Act Amendments, which required it to examine almost 200 air pollutants.

State Investigated Citizen Complaints in 1992 and 1994 Concerning Asbestos-Contaminated Vermiculite

In 1992, in response to a citizen's complaint about potential exposure to asbestos during the demolition of a Libby vermiculite processing facility, Montana inspectors conducted an investigation, and took nine samples at the site. According to EPA, the sample analysis indicated that there was asbestos insulation inside one of the buildings undergoing demolition. The Clean Air Act asbestos standard regulates the demolition of structures containing asbestos material. The state determined that the mine owner had failed to notify EPA of its plans to demolish a building containing asbestos, and had not taken necessary precautions such as wetting the asbestos materials to protect the workers conducting the demolition, as required by the emissions standards for asbestos. Subsequently, the buildings were demolished and the mine owner was fined $510,000 for the violations.

In November 1994, a citizen complained that dust from the same site, as well as from an adjacent road to haul ore from the mine to the processing site, was harming Libby residents. EPA also referred this complaint to the state of Montana for investigation. According to an EPA official involved in the investigation, the state did not take any action because the asbestos found in the vermiculite at the site and on the road was not considered commercial asbestos. The Clean Air Act asbestos standard only regulates emissions of asbestos from asbestos ore (commercial asbestos), not emissions from asbestos-contaminated ores such as the vermiculite from Libby, which are processed for purposes other than extracting their asbestos content. In an April 1995 letter, EPA informed the citizen that neither the state nor EPA planned any action based on the inspection.

EPA did not initiate an investigation leading to cleanup through the Superfund program until November 1999. According to EPA, the agency initiated the investigation in response to local concerns and news articles, which reported the deaths or illnesses of almost 600 current or former Libby residents exposed to asbestos-contaminated vermiculite ore. The EPA investigation team, along with a Montana health official, identified several non-occupational cases of asbestos-related diseases in Libby. Moreover, EPA found actinolite and tremolite asbestos from the Libby vermiculite in more than 30 percent of over 2000 samples taken at residential, business, and public properties around Libby. These and other findings led EPA to conduct further investigations and began cleanup activities in 2000.

Ongoing Cleanup in Libby Expected to Cost $179 Million by 2007, but Funding Must Compete with Other Projects

By 2007, EPA expects to spend about $179 million to complete the cleanup of commercial, residential, and public properties within Libby, as well as the mine and adjacent sites. As of December 2002, EPA had spent approximately $79 million for activities such as sampling and analyses, soil excavation and disposal, property restoration, administrative costs, litigation costs to recover cleanup expenditures; and medical testing of current and former Libby residents. Furthermore, based on early estimates, EPA expects to spend an additional $100 million between 2003 and 2007 to conduct complete cleanup activities in Libby, as well as the vermiculite mine and adjacent sites. Although EPA has stated it is committed to carrying out the Libby cleanup through 2007, this project will compete for funding on an annual basis with other projects.

According to EPA, it initiated cleanup at, based on the initial investigation, what were considered the two most obvious sources of contaminant asbestos in Libby: (1) the former screening plant where the vermiculite ore was separated into different sizes for use in various products and processing facilities located nationwide and (2) a processing facility (the expansion plant) where the ore was heated at 2000 degrees Fahrenheit to remove water and expand the individual granules of ore (like popcorn). In total, the screening plant handled about 6.5 million tons of vermiculite ore between the 1960s and 1990, when the mine closed, according to EPA. At the time that EPA initiated a removal action at the processing sites in 2000, the area around the former screening plant was being used as a wholesale plant nursery, a covered storage facility, and the current owners' primary residence. The site of the former expansion facility, currently owned by the city of Libby, was being leased to a retail lumber mill.

Cleanup-related activities included relocating the residents and businesses from the two sites; demolishing and cleaning up contaminated buildings and structures at the sites; excavating contaminated soil, debris, and vermiculite ore; transporting and disposing of these waste materials at the former mine; and filling the excavated areas with uncontaminated soil. In addition, through an interagency agreement, EPA asked ATSDR to conduct medical testing of current and former Libby residents. EPA sought to identify the asbestos-related health effects of exposure to asbestos from the Libby vermiculite mine. According to ATSDR, almost 18 percent of 6,668 current and former Libby residents who received chest x-rays in 2000 and 2001 were identified as having lung abnormalities.

These participants were referred to their physicians for further diagnosis and treatment.[12]

By December 31, 2001, EPA had spent a total of about $58 million dollars on Libby:

- almost $29 million on cleanup costs;
- almost $13 million for medical testing and health-related activities;
- over $13 million on EPA administrative costs, primarily payroll; and
- almost $3 million enforcement costs associated with cost-recovery litigation against the mine owners.

In July 2001, after additional sampling, EPA identified six other sites in Libby that contained asbestos contaminated materials and required immediate cleanup. In addition to continued cleanup activities at the former processing sites, EPA determined the need to conduct cleanup activities at the six additional sites:

- **Two residential properties**. One site required removing and disposing of unprocessed vermiculite ore; another required removing asbestos-contaminated machinery as well as excavating and disposing of contaminated soil. EPA completed cleanup at the two residential properties by the end of 2001.
- **Three schools**. EPA had to remove and dispose of ore from the running tracks at the Libby Middle and High Schools, as well as ore from a former ice skating rink at the Plummer Elementary School. In addition to these cleanup activities, EPA agreed to conduct other restoration activities such as reconstructing the running tracks with uncontaminated materials at the schools.
- **One road**. EPA paved a portion of Rainy Creek Road, which was used to transport vermiculite ore from the mine to the processing facilities and

[12] In addition, ATSDR conducted a mortality study in 2000 to determine the number of deaths in Libby between 1979 and 1998 that were attributed to exposure to asbestos. (U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry. *Health Consultation: Mortality From Asbestosis in Libby, Montana; Libby Asbestosis Site Libby, Lincoln County, Montana.* Atlanta, Georgia, Dec. 12, 2000.) In August 2002, ATSDR concluded that for the period reviewed, deaths in Libby from asbestosis were 40 to 80 times higher than expected in Libby, Montana, and deaths from lung cancer were 20 to 30 percent higher than expected. (U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry. *Health Consultation: Mortality in Libby, Montana (1979–1998); Libby Asbestos Site, Libby, Lincoln County, Montana.* Atlanta, Georgia, August 8, 2002.)

continues to water the unpaved portion of the road to keep asbestos fibers from becoming airborne.

In calendar year 2002, EPA spent an additional $21.4 million to complete cleanup at the areas around the former processing facilities and the schools, and began to clean up soil and indoor property at more than 900 other residential, commercial, and public properties. EPA designed and constructed a landfill to dispose of materials removed from these properties. Asbestos concentrations found inside the additional properties sampled are attributed to multiple sources of contamination, including take-home contamination from workers' clothing, dust from the processing facilities, vermiculite-containing insulation, contamination from adjacent properties, dust tracked in on people's shoes, and vermiculite material in people's yards. Indoor cleanup activities will include decontaminating the interior of homes with special vacuums, and, when necessary, removing indoor materials such as carpets and drapes. According to EPA, cleanup of these properties should continue through at least 2005, at a rate of 250-300 properties per year.

Beginning in 2002, EPA began the remedial investigative process of screening properties for potential remedial cleanup actions. These actions are expected to begin, at the earliest, by 2004 and continue through 2007. According to the remedial project manager, early budget estimates for cost of the remedial phase is about $100 million. Before remedial cleanup activities can begin, EPA must conduct and complete two studies to determine the extent of additional cleanup and remediation at the residential, commercial, and public buildings. The first study, a performance evaluation, is intended to evaluate several techniques to analyze soil samples containing asbestos, which in turn will be used to choose the most appropriate analytical methods used to collect data necessary for the second study—a site-specific risk assessment study. The risk assessment study will require conducting asbestos dosage response tests on lab animals. EPA will use the risk assessment, along with other information, to establish final cleanup standards for Libby. According to the remedial project manager, EPA expects the risk assessment to show that soil samples containing concentrations of less than 1 percent actinolite and tremolite asbestos found in Libby can present excessive risk in certain situations.[13] Early estimates indicate that there are about

[13] The National Emissions Standard for Hazardous Air Pollution defines asbestos-containing materials as those materials containing more than 1 percent asbestos.

300 additional properties that could be cleaned up, depending on the results of these studies, although this number could increase as more analyses are conducted. According to the remedial project manager, current estimates suggest that remedial cleanup in Libby can be completed by 2007.

Between 2003 and 2007, the remedial project manager also expects to conduct cleanup and remediation at the mine and adjacent sites, including the mine waste water impoundment and ore waste piles sites adjacent to the mine, as well as the rest of Rainy Creek Road. According to the manager, between 2003 and 2005, EPA will conduct a feasibility study to identify the most efficient way of conducting remedial cleanup at these sites.

EPA officials have stated that cleanup in Libby remains a high priority. Moreover, because of the imminent health risk posed by the asbestos-contaminated vermiculite found throughout the community, Libby should remain a high priority for Superfund funding through 2007. However, beginning in 2004, funding for Libby cleanup activities will compete for funding on an annual basis with other projects, including cleanup of other mining sites posing imminent health risks. Funding for the Superfund program, in turn, will complete with other EPA programs and administration budget priorities.

EPA and Other Agencies Have Activities Underway to Address Exposure to Asbestos-Contaminated Material Cleanup in Libby

EPA and agencies within the departments of Labor and Health and Human Services are currently undertaking several activities addressing the potential exposure to substances contaminated with asbestos. EPA is inspecting other sites where potential exposure to asbestos contaminated vermiculite may be occurring, and examining the need to recommend changes to laws and policies to address contaminant asbestos. Departments of Labor and Health and Human Services agencies are, among other things, examining potential current and past exposure to asbestos contaminated vermiculite at mines, processing facilities, and adjacent communities.

EPA Is Taking Actions on Multiple Fronts

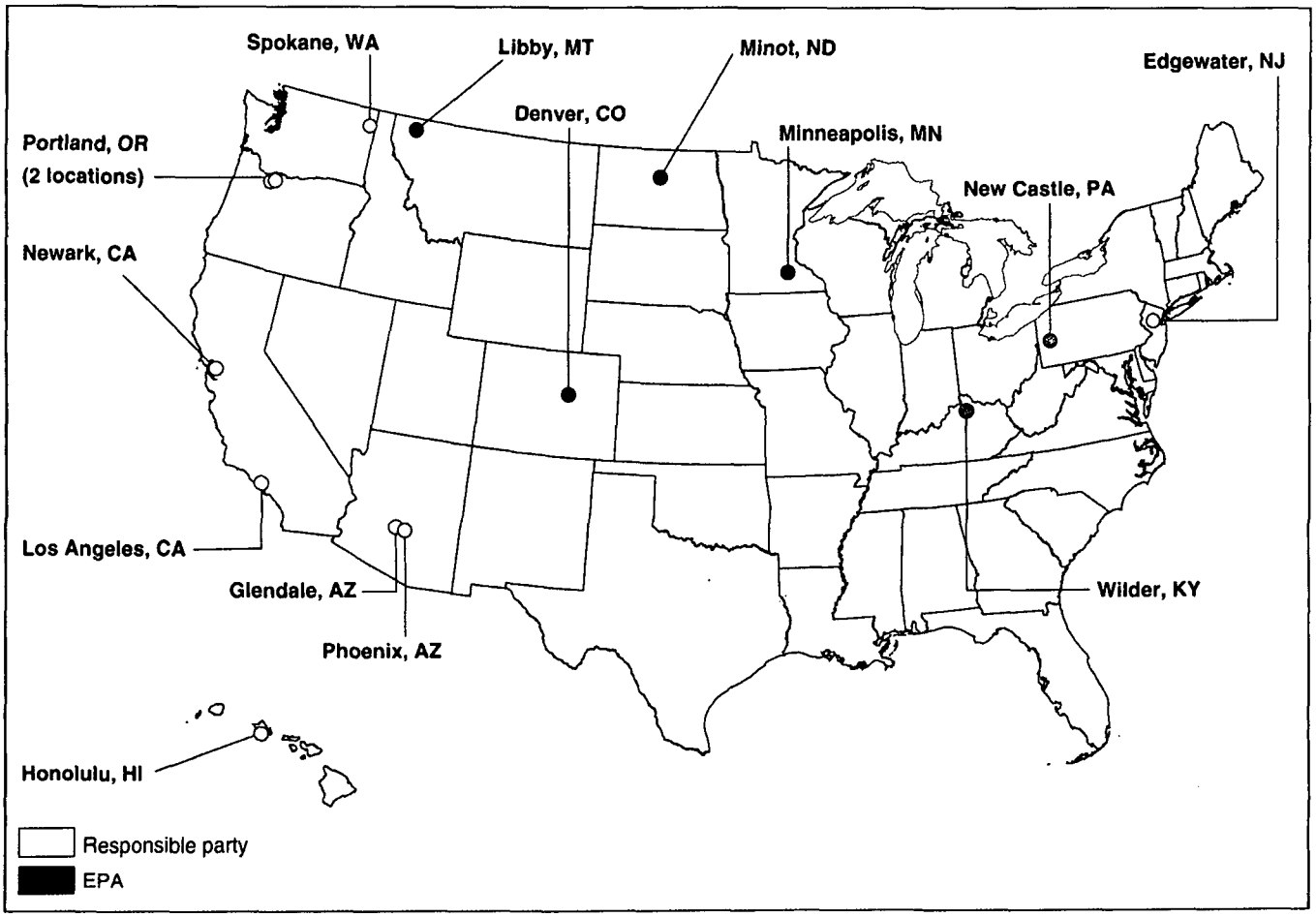
In March 2001, the EPA Inspector General recommended that EPA examine the risks associated with asbestos-contaminated vermiculite in order to safeguard public health and the environment.[14] In responding to the report's recommendations, EPA (1) identified actions underway, in coordination with other federal agencies, to address potential exposure at other asbestos-related sites; (2) agreed to develop a plan to determine the need for a national emissions standard for sources contaminated with asbestos, such as asbestos-contaminated ores; and (3) and agreed to establish an independent panel to provide advice and counsel on policy issues associated with the use and management of different types of fibers, including asbestos.

To respond to the Inspector General's first recommendation, EPA is taking the following actions:

- **Site inspections of 173 processing facilities located nationwide that received Libby vermiculite ore.** From initial site inspections conducted by all 10 EPA regional offices, EPA determined that, in addition to Libby, 19 other sites were contaminated with asbestos-contaminated materials and required further investigation. In 14 of the 19 cases, either EPA (5 sites) or the responsible party (9 sites) have planned, initiated, or completed removal activities. (Fig. 1 shows the location of the 14 sites, in addition to Libby, requiring cleanup by EPA or the responsible parties.) EPA or the responsible parties are still investigating five other sites.

[14] U.S. Environmental Protection Agency. Office of Inspector General. *EPA's Actions Concerning Asbestos-Contaminated Vermiculite in Libby, Montana.* Washington, D.C., March 31, 2001.

Figure 1: Vermiculite Ore Processing Sites Requiring Cleanup



Source: EPA (data) and GAO (analysis).

By the end of 2003, EPA will spend over $7.4 million at the five sites on cleanup-related activities, including sampling and analyses; and soil excavation, disposal, and restoration. Table 1 provides information on the five sites that EPA is planning to clean up by the end of 2003.

Table 1: Location and Estimated EPA Cleanup Costs of Sites That Received Libby Ore

Location	Tons of Libby vermiculite ore processed	Current use of existing facilities	Range of asbestos concentrations at site	Estimated cleanup costs
Denver, Colorado	100,415	Corn syrup production plant	Up to 12 percent	$150,000
Wilder, Kentucky	222,110	Repair and maintenance shop	Up to 5 percent	1,400,000
Minneapolis, Minnesota	118,465	Prison furniture and security equipment factory; and 260 residential homes in the area[a]	Up to 20 percent	4,201,607
Minot, North Dakota[b]	14,000	City and community group storage facility	Up to 12 percent	1,180,000
New Castle, Pennsylvania	172,140	Vacant property	Up to 3 percent	500,000
Total				**$7,431,607**

Source: EPA (data) and GAO (analysis).

[a]EPA completed cleanup of factory site in 2001.

[b]EPA completed cleanup in 2002.

- **Studying potential exposure to asbestos-contaminated vermiculite in consumer products.** In August 2000, EPA issued two reports examining potential exposure to asbestos from consumer products containing vermiculite such as potting soil and packaging filler, and has drafted a third report on attic insulation expected to be issued in April 2003. According to an EPA official, these and other studies show that hazardous exposure to airborne asbestos fibers can occur when any amount of asbestos-contaminated vermiculite is disturbed. Therefore, EPA is recommending that consumers handle vermiculite garden products with care, such as using these products outdoors or in a well-ventilated area and damping it during use to avoid creating dust. EPA is also recommending that homeowners should avoid disturbing the vermiculite insulation in their attics, and that only certified professionals should test this type of insulation or remove it from homes.

In response to the Inspector General's second recommendation for the possibility of a national emissions standard for contaminant asbestos (under the authority of the Clean Air Act) found in other materials such as vermiculite, EPA's Office of Air and Radiation will conduct multiple activities. Currently, the National Emission Standards for Hazardous Air Pollutants applies to the milling, fabrication, manufacturing, application, demolition, renovation, and disposal of asbestos and asbestos-containing commercial products. Initially, the office plans to participate in coordinating entities, such as EPA's Asbestos Coordination Team, and an

interagency asbestos group,[15] to avoid duplicating efforts and to take advantage of expertise found elsewhere. For example, to identify all available information about the presence of asbestos in vermiculite mining and processing operations, the office will collect existing information from local, state, and federal agencies, including regional EPA offices. While considering the need for a national emissions standard for sources of contaminant asbestos, the Office of Air and Radiation will build upon the work conducted by other EPA offices. For example, for the Office of Air and Radiation to characterize potential risks associated with selected asbestos emissions sources, it must rely on an update by the Office of Research and Development of the Integrated Risk Information System file for asbestos to include more current information about the cancer and noncancer health effects of asbestos exposure. The official responsible for updating the file expects to complete work on non-cancer health effects (asbestosis) by 2005. Work on cancer-related health effects (lung cancer and mesothelioma), which EPA expects to also complete by 2005, depends on work now being conducted for the Office of Solid Waste and Emergency Response. This office has taken the role of organizing conferences and workshops for both cancer and non-cancer related health effects.[16]

Finally, in response to the Inspector General's recommendation for considering regulatory changes, the Office of Prevention, Pesticides and Toxic Substance assembled an independent panel, known as the Asbestos Focus Group Project, to consider, among other things, regulatory and legislative options for regulating asbestos. Panel members include representatives from EPA and other federal regulatory agencies, state governments, industry, academia, and other interest groups. The panel is considering such issues as exposure to asbestos in products and materials; exposure to naturally occurring asbestos, including asbestos found in concentrations of less than 1 percent; medical and health issues related to

[15] The Asbestos Coordination Team was formed in October 2000 to promote and coordinate immediate response activities as well as other longer-term asbestos activities across EPA's program offices. Since September 2002, EPA, the Mine Safety and Health Administration, the Occupational Safety and Health Administration, the National Institute for Occupational Safety and Health, the Agency for Toxic Substances and Disease Registry, the U.S. Geological Survey, and the National Institute of Standards and Technology have met approximately every quarter for the stated purpose of having an informal exchange of policy, procedural, and technical information regarding asbestos.

[16] The Office of Solid Waste and Emergency Response convened a peer consultation review by independent scientists of a new risk methodology for asbestos in February 2003.

asbestos exposure; and different methods used to analyze asbestos. EPA expects to issue a final report with recommendations by April 2003.

Other Federal Agencies Also Taking Actions

The Department of Labor has also begun to consider updating its regulations on asbestos. In light of asbestos related deaths and serious health problems in Libby, the Mine Safety and Health Administration began examining its sampling methods and analyzing data from samples taken at different types of mines to ensure that it is able to detect very small asbestos fibers, such as those detected by EPA in Libby vermiculite ore.

The agency has taken almost 900 samples at more than 40 operations employing more than 4,000 miners in an attempt to determine miners' current exposure levels to asbestos. In addition, the agency published a proposed change to their rules and asked for comments from the mining public on lowering the exposure limit to asbestos fiber; using a more sensitive method to analyze fibers in air samples; and addressing take-home contamination issues. In conjunction with the proposal, they conducted seven public hearings throughout the country. The analysis of the sample results and the comments received in response to the proposal are being used to assist the agency's decision-making process in determining what actions will be taken to respond to the Department's Inspector General report about asbestos exposure in Libby.[17] The agency is developing an options paper to present to the Assistant Secretary for Mine Safety and Health in April 2003. The options paper will present alternative methods available to the agency to protect miners from overexposures to asbestos in mining facilities.

Two agencies within the Department of Health and Human Services are also taking actions on asbestos-contaminated vermiculite.

- **ATSDR**. In 2001, the agency began funding states' efforts to identify communities with excess numbers of asbestos-related diseases that are located near facilities identified by EPA as having received or processed Libby vermiculite ore. The agency provided a total of $1.6 million in grants to nine states in fiscal years 2001 and 2002; these states are to analyze and

[17] U.S. Department of Labor. Office of Inspector General. *Evaluation of MSHA's Handling of Inspections at the W.R. Grace & Company Mine in Libby, Montana.* Washington, D.C., March 22, 2001.

report their findings to ATSDR within 3 years.[18] In another study, begun in 2002, the agency inspected 28 processing facilities that received vermiculite ore from Libby, which it identified as having the highest potential for exposure to contaminant asbestos. ATSDR examined processing facilities that received greater than 100,000 tons of vermiculite ore from Libby, as well as other processing facilities that EPA identified as needing further action. According to ATSDR officials, the agency will begin publishing site-specific public health consultations on their findings in mid 2003, and, where appropriate, make recommendations for actions to protect public health. The agency expects to issue a comprehensive report in 2004. Also, ATSDR provided a grant totaling $550,000 in 2002 to the Montana State Department of Public Health and Human Services for continued medical testing of people that were exposed to high concentrations of asbestos-contaminated vermiculite in Libby. Additionally, in 2003, ATSDR is developing the Tremolite Asbestos Registry of persons potentially exposed to asbestos in Libby, primarily to inform people that may have been exposed to this type of asbestos, as well as to collect data that can be used in health studies on asbestos-contaminated vermiculite.

- **Centers for Disease Control and Prevention**. In response to a request by the Occupational Safety and Health Administration, the Centers' National Institute for Occupational Safety and Health is examining the potential for current occupational exposure to contaminant asbestos in vermiculite at nurseries and processing facilities. The Institute collected samples at three plant nurseries operated by the Departments of Agriculture and of Interior, as well as at seven plants that process domestic and imported vermiculite. The Institute expects to report results of its analysis in 2003. The Institute is also updating an earlier study, published in 1987, that documented significant excesses of asbestosis and lung cancer related to asbestos fiber concentrations in the work environment at the Libby mining and milling operations. [19] The update, expected to be completed in 2005, is intended to yield better precision in quantitatively estimating risk associated with fiber exposure from the Libby vermiculite. Also, the Institute will publish a fact sheet in 2003 that will provide guidance to workers and employers on the safe handling of vermiculite or vermiculite-containing products that may be contaminated

[18] The nine states participating in the study are: California, Colorado, Louisiana, Massachusetts, Minnesota, New Jersey, New York, Utah, and Wisconsin.

[19] Amandus, H.E., Wheeler, R. (1987): "The Morbidity and Mortality of Vermiculite Miners and Millers Exposed to Tremolite-Actinolite: Part II. Mortality." *American Journal of Industrial Medicine* 11:15-26.

with asbestos.

Agency Comments and Our Evaluation

We provided EPA, the Department of Health and Human Services, and the Department of Labor with a draft of this report for review and comment. Both EPA and the Department of Health and Human Services provided technical comments that we incorporated into the draft report as appropriate. The Department of Labor did not have any comments on the draft report.

Scope and Methodology

To determine the history of EPA's involvement in Libby, Montana, we obtained administrative records from EPA's Region 8 Office in Denver, Colorado. These administrative records contain thousands of documents on EPA's actions dealing with asbestos-contaminated vermiculite ore originating from Libby.

To determine the cost of cleanup in Libby, we obtained cost information from Region 8 officials and the Department of Justice. EPA and Justice had assembled these documents for its cost-recovery litigation with the mine's owners and other potentially responsible parties.

To determine the status of actions EPA and other federal agencies are taking to address future exposure to asbestos-contaminated vermiculite, we collected documentation and interviewed officials from several EPA offices, including the Office of Solid Waste and Emergency Response, the Office of Pollution Prevention and Toxics, and the Office of Air and Radiation. We visited Libby, Montana to interview the EPA official responsible for oversight of the cleanup at that location. We also interviewed and collected documentation from officials in EPA's regional offices in Chicago, Dallas, and Denver who were responsible for conducting site inspections at some of the 173 sites that received vermiculite ore from the Libby mine. We judgmentally selected these regions because, combined, they accounted for about 50 percent (86) of the 173 sites. To determine the cost of cleanup at other sites that received Libby vermiculite ore, we collected documentation and interviewed officials in EPA's regional offices in Atlanta, Chicago, Denver, and Philadelphia. We also interviewed and obtained documentation from officials from other federal agencies involved in ongoing activities to address potential exposure to asbestos-contaminated materials at other sites around the country. These other agencies include the Mine Safety and Health Administration and the Occupational Safety and Health Administration in the Department of Labor, and the Agency for Toxic

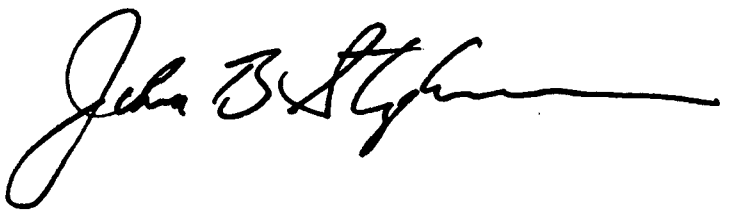
Substances and Disease Registry and the National Institute for Occupational Safety and Health in the Department of Health and Human Services.

We conducted our work between June 2002 and February 2003 in accordance with generally accepted government auditing standards.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. We will send copies of this report to the Administrator of EPA, the Secretary of the Department of Health and Human Services, the Secretary of the Department of Labor, the Director of the Office of Management and Budget, and other interested parties. We will make copies available to others on request. This report will be available at no charge on our Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please call me at (202) 512-3841. Key contributors to this report are listed in appendix I.

Sincerely yours,



John B. Stephenson
Director, Natural Resources and the Environment

Appendix I: GAO Contacts and Staff Acknowledgments

GAO Contacts

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Acknowledgments

In addition to those named above, Bernice H. Dawson; Arturo Holguín, Jr.; Robert E. Kigerl; and Carol Herrnstadt Shulman made key contributions to this report.

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