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Ref: EPR-SR

ACTION MEMORANDUM AMENDMENT

SUBJECT: Action Memorandum Amendment Request: Approval of a Ceiling Increase for the Time-Critical Removal Action at the Libby Asbestos Site - Libby, Lincoln County, Montana

FROM: Carol Rushin
Acting Regional Administrator

THROUGH: James E. Woolford, Director
Office of Superfund Remediation and Technology Innovation

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TO: Mathy V. Stanislaus
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Office of Solid Waste and Emergency Response

Re: Site ID#: BC
Category of Removal: Time-Critical, NPL, EPA Fund-Lead

I. INTRODUCTION

A. Purpose of this Amendment

The purpose of this Action Memorandum Amendment is to request and document your approval of a ceiling increase for the Libby Asbestos Site (Site or Libby) in Lincoln County, Montana. In addition, the actions covered by this Amendment will help address the contamination that resulted in EPA Administrator Lisa P. Jackson's Determination and Findings of Public Health Emergency at the Libby Site pursuant to CERCLA Section 104(a)(4). (See Attachment 1)

B. Summary of Action Memorandum Amendment

The initial Action Memorandum was signed May 23, 2000 and supported the initiation of the removal activity in Libby, Montana. This was followed by amendments in July, 2001; May,

2002; May, 2006; and June, 2006. These amendments raised the cost ceiling or expanded the scope of the cleanup. The most recent Action Memorandum Amendment signed September 24, 2008 addressed asbestos contamination in certain creeks in Libby. The currently proposed amendment will cover the site-wide ongoing commercial, public, and residential cleanups in Libby, as well as in the nearby Troy, Montana area. Note that an additional Amendment is being considered for later in 2009 that would address a particularly large cleanup within the Libby Site, the Cabinet View Country Club (CVCC) Golf Course.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

Vermiculite mining operations conducted in Libby, Montana between the 1920s and 1990 produced asbestos-contaminated vermiculite. The Libby mine produced up to 80% of the world's supply of vermiculite, which was used primarily for insulation and as a soil amendment. These products were produced by a high temperature process (exfoliation) that expands the raw ore. The milling process reportedly emitted up to 5,000 pounds of asbestos per day to the atmosphere. The vermiculite from the Libby mine was contaminated with a toxic and highly friable form of asbestos called **Tremolite-Actinolite Series Asbestos**, often called Libby Asbestos (LA). For many decades, the asbestos-contaminated vermiculite was utilized throughout town in many public places such as school tracks, public parks, and baseball fields. Vermiculite mine tailings were also placed at some of these locations. Vermiculite insulation was also used in residences, public buildings, and schools.

The Libby Site (also comprising the Troy area) is an especially large and complex site in which a hazardous contaminant, LA, is prevalent throughout the town and surrounding areas. The prior Action Memorandum and Amendments describe how asbestos-contaminated vermiculite came to be present in commercial and residential buildings as well as outdoor areas. They also describe the nature of the contaminant and the unique threat it poses in Libby given the multiple pathways of exposure.

The initial Action Memorandum and subsequent Amendments describe the vermiculite mine, vermiculite processing facilities, several contaminated properties, and the conditions found throughout the Libby Valley. The Libby Site appears unique in comparison to other mining or processing sites in that LA-containing mine wastes, as well as off-specification intermediates (largely un-exfoliated vermiculite concentrate) were made available, and hence, widely distributed, throughout southern Lincoln County for use as fill material and as a soil conditioner. Other asbestos-contaminated material was used as insulation. There are numerous exposure pathways, for residents as well as for workers. When the Site was listed on the National Priorities List (NPL), it included the nearby town of Troy. EPA's initial investigative efforts focused on the Libby area and then expanded to the Troy area in May 2007. Assessment work in Troy is being conducted by the Montana Department of Environmental Quality (MDEQ) through a

cooperative agreement funded by EPA. An interim data summary report on the assessments in Troy was released on May 27, 2009. MDEQ has indicated that 102 of the properties there are likely to require cleanup. This amendment includes activities to address contamination found in the Troy area as well as in Libby.

B. Other Actions to Date

To address this widespread contamination, EPA has been conducting cleanups of asbestos-contaminated soils and insulation throughout Libby (and also the neighboring community of Troy) since 1999 using its removal authorities under CERCLA Section 104. This Action Memorandum amends the May 15, 2006 (approved June 2, 2006) Action Memorandum Amendment that sets set forth the need and scope for additional property cleanups at the Site. While those time-critical cleanup activities are progressing, investigation efforts that began in May 2007 in the town of Troy indicate that a significant number of properties there also meet the current site removal criteria (see Administrative Record, Cleanup Criteria Memo, December 15, 2003). Prior to these investigations, EPA had conducted several small-scale responses in Troy as conditions warranted. The nature of the residential and commercial cleanups in Libby is shifting to larger and more difficult properties.

This Action Memorandum Amendment and prior Amendments each describe various activities at the Site and progress contemporaneous with their writing. Generally, activities in 2000 focused on the former W.R. Grace processing facilities (Export Plant, Screening Plant) that were large volume, obviously highly contaminated properties. In 2001, work continued at the processing areas and then expanded to include some large volume property cleanups containing extensive amounts of vermiculite mine waste (e.g., the High School and Middle School tracks and the Plummer Elementary ice rink). The distribution of LA-bearing mine waste throughout the community became apparent in 2001. Residential and commercial property cleanups began in 2002.

As EPA has reported in Site updates and in public meetings, EPA conducted activity-based sampling at residential and commercial properties in Libby in 2007 and 2008. *See Site update at http://www.epa.gov/region8/superfund/libby/cleanup.html.* The purpose of this sampling primarily is to assess the level of human exposure that may occur during particular activities, such as digging, raking, and mowing. The current activity-based sample collection effort has been completed, and an EPA contractor is preparing a report analyzing the results. Preliminary review of these results indicates that the current removal action level for asbestos in soil is likely to be revised to a lower concentration. To ensure that the data analysis and presentation are reliable, the report will undergo an internal agency quality assurance/quality control review. We expect that process to be completed and the report to be finalized this fall. Once the report has been finalized, it may be appropriate to revise the current action level that has been used by EPA at the Site. A change to the action level would be reflected in an appropriate decision document. EPA anticipates not being able to address properties with lower asbestos concentrations

immediately, given that there are several hundred properties already in the cleanup queue with higher concentrations. Currently EPA is cleaning up approximately 150 properties per year.

Below is a summary table (Table 1) of the work performed during the history of on-site Removal Actions, as well as a narrative synopsis of the work items:

Table 1: Work to Date Summary

	Large Projects	Commercial/ Residential	Soil (yds^3)	VAI* (yds^3)	Debris (yds^3)
2000	Screening Plant (SP), Export Plant(EP)	0	150,000	0	35,000
2001	SP, EP, Libby High School(LHS), Libby Middle School(LMS), Plummer Elementary, Seifke,	8	120,000	0	5,000
2002	SP, EP, LHS, LMS,	18	75,000	300	1,000
2003	Riverside Park Properties	157	40,000 15,000	2,200	250
2004	SP-Flyway Properties	170	30,000 16,000	2,300	125
2005	Properties	225	31,000	2,700	200
2006	Properties	216	26,000	3,100	175
2007	Properties	160	46,000	2,200	150
2008	Properties**	149	49,857	1,304	593
Total		**1,103**	**598,857**	**14,104**	**42,493**

*VAI: Vermiculite Attic Insulation.
** These totals do not include cleanup activities at Granite, Callahan or Flower Creeks.

C. Synopsis of Previous Actions

There are seven operable units (OUs) at the Site, as well as a sitewide support service, and two disposal units. Following is a description of the activities for each.

Export Plant (OU1): Under a Unilateral Order from EPA, W.R. Grace demolished and disposed of four buildings on the property and removed approximately 15,500 yds^3 of contaminated soil and 2500 yds^3 of debris from the property. Region 8 completed the remaining demolition and disposal in 2002. The lumber business formerly operating at this location was relocated by W.R. Grace in 2003 to a new location in Libby. This work is summarized in a Data Summary Report (CDM 2007) found in the Administrative Record.

(1) **Riverside Park and Boat Ramp:** This is an area adjacent to the former Export Plant along the Kootenai River. Although it was not part of the W.R. Grace operations, it is now included as part of OU1. In 2003, subsurface contamination was encountered during construction of a new park and boat ramp being built by the City of Libby. EPA halted construction and cleaned the parcel in late 2003. Approximately 15 acres of soil were excavated to an average depth of two feet. This resulted in the removal of approximately 40,000 yds^3 of contaminated soil. This work is summarized in a Data Summary Report (CDM 2007) found in the Administrative Record.

Screening Plant (OU2): This property consists of five distinct, contiguous parcels. In total, roughly 335,000 yds^3 of contaminated soil, and 30,000 yds^3 of debris were removed from the Screening Plant and taken to the mine for disposal. This work is summarized in a Data Summary Report (CDM 2007) found in the Administrative Record. The five parcels include:

(1) **Raintree Nursery**: Region 8 completed cleanup of this parcel in 2003. Approximately 17 acres were addressed, and 250,000 yds^3 of contaminated debris and soil were removed. Restoration of this parcel is complete.

(2) **North Side Parker Property:** Region 8 completed cleanup here in 2004, addressing approximately four additional acres. Approximately 18,000 yds^3 of contaminated soil were removed.

(3) **Flyway Property:** Region 8 completed approximately 1/4 of the cleanup of the Flyway parcel in 2002; W.R. Grace, pursuant to an Administrative Order on Consent with EPA. cleaned up the remainder of the parcel in 2004. In all, approximately sixteen acres were addressed, and approximately 30,000 yds^3 of soil were removed. EPA, working with the Montana Department of Transportation, capped a contaminated area on the Highway 37 right-of-way (ROW) along the Flyway in 2005.

(4) **KDC Bluffs Property**: Three areas of the KDC Bluffs parcel contained piles of waste vermiculite and debris. These were cleaned up by EPA in 2001 with approximately 15,000 yds^3 of soil removed. There remains a section of the KDC Bluffs that has been found to have levels of LA at <1% over two to three acres. At the time of the Removal Action these areas were unoccupied, and as such were left for future Remedial Actions. Recently, an out-of-state homeowner built a house on a portion of the property. Since the KDC Bluffs property now includes residential development, EPA proposes to address this property as part of OU4. If necessary, future residential properties on the KDC Bluffs area will be screened and cleaned up as part of OU4.

(5) **Wise Property:** This is a ¾ acre property between Raintree Nursery and the Flyway. Approximately 2000 yds^3 of LA-contaminated soil were removed in 2001. This property was used as an access point for the flyway cleanup, thus the restoration was not completed until 2005.

Mine/Rainy Creek Road (OU3): Rainy Creek Road is a US Forest Service access road to the Kootenai National Forest and the former vermiculite mine. Like the mine itself, Rainy Creek Road is highly contaminated with LA, and site access remains restricted. In actions conducted in 2001 and 2003, EPA paved the lower portion of the road starting from where it intersects Highway 37. A decontamination station has been in place on the road since 2000 to facilitate soil disposal at the former mine, as well as to clean other vehicles accessing the area. Soil disposal of OU4 and OU7 waste material continues at the mine. In 2007, EPA signed an Administrative Order on Consent (AOC) with W.R. Grace to conduct a Remedial Investigation/Feasibility Study (RI/FS) on OU3. Sampling activities began in September 2007 and continue in support of the planned 2012 RI/FS and Record of Decision (ROD).

Commercial, public and residential cleanups in Libby (OU4): Once the Libby Asbestos Site was placed on the NPL in October 2002, the EPA began as part of its RI to systematically inspect and sample parcels of land within the Site boundary. This information was also used to identify properties in need of time-critical Removal Actions. Removal actions were undertaken within homes and yards to reduce risk to property owners and mitigate the release or threat of release of LA into the environment. Any LA within homes may be dispersed to the environment through foot traffic, air currents, and cleaning and disposal. To date, EPA has identified 4,400 properties that needed inspections (see Contaminant Screening Study (CSS), CDM 2004 in the AR). This screening effort identified roughly 1600 properties which met the Site Removal Criteria described in the December 2003 Technical Memorandum. As of December 18, 2008, Removal Actions have been completed at 1,103 of the identified properties. It should be noted that the CSS also identified an additional 840 properties that had LA contamination, but did not meet the Site Removal Criteria.

(1) **Libby High School and Libby Middle School Tracks:** Cleanups were completed by 2001, and both tracks were restored in 2002. Work is complete.

(2) **Siefke Property:** This parcel was a highly contaminated, large residential property. A considerable volume of equipment and debris from the former vermiculite mine was located on the property. Cleanup was completed in 2002, and restoration was completed in 2003.

(3) **Johnson, Sanderson, Temple, Struck, Rice, Fuhlendorf, Spencer, and Westfall Properties:** These properties contained mine wastes with LA concentrations up to 10%. Cleanup and restoration activities were completed by 2003.

(4) **Champion Hall Road:** Vermiculite mine tailings had been used to make and/or repair portions of a gravel road leading into a subdivision. Cleanup was completed in 2003.

Former Stimson Lumber Mill (OU5): The former Stimson Lumber Mill contained vermiculite attic insulation (VAI) in a number of its buildings. Apart from EPA's actions, the Stimson

Lumber Company systematically removed all of its loose and accessible VAI in 2002 and 2003. Due to a downturn in the lumber market, most of the Mill operations closed in 2003, and a large portion of the 400 acre parcel was sold to the Kootenai Redevelopment Authority in 2004. The Redevelopment Authority has been, and is now actively seeking businesses to locate on the former Mill property. Investigations to date have found limited soil contamination in the former nursery area. This area was fenced in 2004. The only other area of this OU that presented an obvious need for response was the former Central Maintenance Building. EPA removed the dilapidated portion of the roof in 2005. This work is summarized in a Data Summary Report (CDM 2007) found in the Administrative Record.

Burlington Northern Santa Fe Rail Yard (OU6): The Burlington Northern Santa Fe (BNSF) Rail Yard is located adjacent to the former Export Plant and was used to facilitate rail shipments of vermiculite. OU6 is comprised of the rail yard, and the rail lines leading out of Libby. Pursuant to an AOC with EPA, BNSF began cleanup of the contaminated rail yard in 2003 but had to stop work due to complexities with soil removal below the tracks. Work resumed in 2004. Most of the tracks in the rail yard were removed to allow for cleanup underneath them. Although most of the contaminated soil was removed, some contamination was capped in place. Institutional controls for contamination left in place will be evaluated as part of the RI/FS and future ROD. EPA is negotiating with BNSF to conduct and complete the RI/FS for this OU.

Troy (OU7): Systematic investigations of properties in the Troy area began in May 2007. However, prior to these investigations EPA conducted several small scale responses in Troy as conditions warranted, the largest of which was the removal of VAI from the Troy High School. This particular action is discussed at length in the June 2006 Action Memorandum Amendment. The other actions included cleanup and disposal of VAI encountered unexpectedly by a property owner.

Environmental Resource Specialist (ERS) - (Site Wide): Over the last five years, EPA has responded to many unplanned, somewhat urgent exposures to VAI and LA. For example, three house fires occurred on properties containing VAI. Likewise, a new homeowner in Libby conducted home renovations and encountered VAI in the walls of his bathroom. As a result, exposed material contaminated a portion of the home and potentially caused a release of friable asbestos into the environment. The EPA has also received numerous calls from property owners who are planning a renovation and anticipate encountering LA-bearing materials. Clearly, in the latter case, the best course of action is to protect property owners by delineating and addressing potential LA contamination prior to renovation. The need for this function will likely continue beyond EPA's Response Actions at the Libby Site. Beginning in October 2006, EPA began providing a full-time service, entitled the Environmental Resource Specialist, to assist property owners, firemen, and other affected response personnel or citizens. In 2007, the ERS service received approximately 40 calls per month requesting assistance and averaged five small-scale responses per month. Calls to the ERS in 2007 also resulted in five large-scale cleanups.

Lincoln County Landfill Asbestos Cell: In 2003, EPA constructed an asbestos disposal cell at the Lincoln County Landfill to facilitate the disposal of VAI material and extend the construction season. To date, the EPA has placed over 20,000 yds^3 of VAI and LA-contaminated debris at this cell. Disposal operations are ongoing.

Disposal Area at the Mine Site: Asbestos-containing soils are disposed of at area 19 at the mine.

D. Current Actions

The Region plans on cleaning up between 100 and 150 properties and three additional creek segments in 2009. The Region is also planning to address the CVCC Golf Course in 2009 under a separate action memorandum amendment.

In 2007, EPA Region 8 initiated investigative efforts to continue to assess the on-going Removal Actions, as well as to provide the needed exposure assessments to support a baseline risk assessment. The Sampling and Analysis Plans for these investigations included a sampling and analysis plan for outdoor ambient air monitoring at OU4; a sampling and analysis plan for activity-based outdoor air exposures for OU4; and a sampling and analysis plan for activity-based indoor air exposures for OU4. As stated earlier, the report on the activity based sampling is planned to be issued this fall and may affect future activities.

In addition to conducting physical cleanups, EPA continues to provide guidance, training and assistance for Libby residents. Such actions include the ERS service; the development and publication of fact sheets for residents and local contractors who may encounter asbestos-contaminated vermiculite; asbestos abatement and health and safety training for local contractors; and public warnings for areas of contamination discovered in public areas. These actions are intended to address ongoing exposures.

MDEQ continued its assessment efforts in the Troy area in 2008. During the 2008 construction season severe conditions at six properties in Troy warranted immediate action by EPA. These actions were taken due to contamination well above the cleanup criteria set forth in the 2003 Technical Action Memorandum. Field investigations in Troy resumed in June 2009. EPA anticipates finding and cleaning up an additional 5 to 10 severely contaminated homes in the Troy area in 2009.

E. State, Local, and Other Authorities' Roles

As discussed earlier, MDEQ has taken the lead role for assessment in Troy (OU7). The Agency for Toxic Substances and Disease Registry (ATSDR); the United States Geological Survey (USGS); and the National Institute for Occupational Safety and Health (NIOSH) are active participants in site-wide studies. The USGS also continues to provide EPA with technical assistance regarding the mineralogy, morphology, and measurement of LA. Lincoln County and

the City of Libby are active in several local advisory groups and coordinate directly with EPA on many issues regarding the removal actions and remedial investigations. In addition to their lead role for assessment in Troy, MDEQ continues to serve as the support agency at operable units 1 through 6.

III. THE THREAT POSED BY ASBESTOS AT THE LIBBY SITE IS UNIQUE IN ITS SEVERITY AND SCOPE

In conducting this large-scale removal action at Libby, EPA has identified a combination of socioeconomic, atmospheric, and terrain-related factors that have resulted in widespread asbestos contamination, multiple pathways of human exposure to asbestos, and significant cumulative exposures. This combination of factors appears unique to the Libby Site and is one of the bases for the Administrator's Determination and Findings of Public Health Emergency.

A. Multiple Sources of Exposure

Residents of the Libby and Troy communities have been exposed to asbestos from various sources, including asbestos in vermiculite, vermiculite processing wastes, asbestos in uncontained vermiculite insulation, and vermiculite-containing soil. The vermiculite mine wastes, as well as off-specification intermediates (largely un-exfoliated vermiculite concentrate) were made available to the community and were widely distributed throughout southern Lincoln County. The community used this asbestos-containing material as a soil amendment in residential yards and as fill for their driveways, gardens, and public areas, including recreational fields. Many of the homeowners insulated their homes with the asbestos-containing vermiculite insulation. Children in the community had access to and played on waste vermiculite piles. These exposures are in addition to the significant exposures that occurred historically to vermiculite mine workers or association with them.

Soil in the Libby valley was additionally contaminated by the atmospheric deposition of asbestos released from the vermiculite processing facilities at the Libby Site, which were in close proximity to the homes there. Soil also may have been contaminated by atmospheric redistribution of asbestos from the community's transportation and uses of the vermiculite mine wastes. Atmospheric deposition also would have contributed asbestos to indoor dust in residences and commercial buildings. Asbestos released to air was likely concentrated by the unique topographical and meteorological situation at the Libby Site (US EPA 2008). The Site is in a narrow valley surrounded by mountains that are 4,000 feet higher. In winter this leads to persistent temperature inversions that concentrate atmospheric contaminants, including asbestos, in the valley.

B. Multiple Pathways of Exposure, and Types of People Exposed

The major source of health risk from asbestos is from the inhalation route of exposure. The historical, current and potential future environmental pathways to the inhalation route of exposure include the following:

1. Air in attic spaces and crawl spaces (resident, tradesperson)
2. Indoor air near breached walls (resident, tradesperson)
3. Indoor air where fibers are present in indoor dust (resident, tradesperson, commercial worker, student, teacher)
4. Outdoor air near highways and rail lines where asbestos material spillage occurred (tradesperson, resident)
5. Outdoor air near disturbed soil (resident, tradesperson, student, teacher, recreational visitor)
6. Outdoor ambient air (resident, commercial worker, tradesperson, student, teacher, recreational visitor).

Additional historical inhalation pathways included the following:

1. Vermiculite waste piles (children, resident, recreational visitor)
2. Association with vermiculite mine workers
3. Occupational exposure through employment at the mine.

C. Observed Health Effects in Libby

Exposure pathways similar to those described above have been noted at other sites where vermiculite was shipped, processed or handled, or where vermiculite insulation was used in homes and businesses. However, the Libby Site appears unique with respect to the multiplicity of exposure pathways and the cumulative exposures experienced by community members. Adverse health effects (described below) from asbestos exposure are already present and documented in the residents and community members at the Libby Site. Ongoing exposure may be expected to increase both the severity and incidence of observed health effects. Even in the absence of additional exposure, pulmonary and pleural health effects from asbestos exposure are known to continue to progress. (Rohs et al. 2008). Therefore, the incidence and severity of observed health effects may increase.

Several epidemiology studies have reported increased cancer mortality among workers exposed to the LA through the mining and milling of contaminated vermiculite. Compared to standardized national mortality rates, the most recent study (Sullivan, 2007) found statistically significant increased risks of cancer mortality. The workers had 70% higher risk of lung cancer mortality (n, the number of people, was 89), 1,410% higher risk of mortality from mesothelioma (n=2) and 2,230% higher risk of mortality from pleural cancer (n=4).

An ATSDR study of the Libby community found a high prevalence of pleural abnormalities and that the risk increased with age and length of residence in the Libby area. (Peipins et al. 2003) examined occupational, recreational, household, and other exposure pathways. The prevalence of pleural abnormalities increased with increasing number of exposure pathways, ranging from 6.7% for those who reported no apparent asbestos exposures to 34.6% for those who reported ≥ 12 pathways. Excluding former W.R. Grace workers but not those with work-related asbestos exposures, the investigators found 1,000 people with pleural abnormalities out of 6,303 (15.9%). For comparison, studies of groups with no substantive work-related asbestos exposures have found the prevalence of pleural abnormalities ranges from 0.2% among workers in North Carolina, to 2.3% among patients in New Jersey, to 4.6% among urban New Jersey residents.

Medical monitoring of Libby and Troy residents exposed to past releases of asbestos fibers or who may continue to be exposed to asbestos fibers in the community would allow early detection of disease and provide a better understanding of disease progression.

IV. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

This Action Memorandum, prior Amendments and the Administrative Record describe in detail the threats to human health presented by exposure to LA. Despite considerable progress on cleanup, conditions in Libby still present significant threats to public health. In fact, on June 17, 2009, EPA Administrator Lisa P. Jackson issued a Determination and Findings of Public Health Emergency at the Libby Site pursuant to CERCLA Section 104(a)(4).

EPA has considered all of the factors described in Section 300.415(b)(2) of the National Contingency Plan (NCP), and has determined at least three of the factors continue to be present at the Libby Asbestos Site, including the area of Troy.

A. Threats to Public Health or Welfare:

(i). *Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants and contaminants*;

While EPA's actions have reduced LA-contaminated source materials (e.g., indoor dust, yard and garden soils, driveway materials, vermiculite insulation), these sources still exist throughout the community. This Action Memorandum Amendment and previous Amendments have described these conditions in detail. Previous investigations have shown that more than one-third of the approximately 4,400 properties in the Libby area contain varying levels of contaminated source materials, such as vermiculite insulation or contaminated soils. EPA studies in the Administrative Record (AR) have found that low levels of amphibole asbestos in soils can generate airborne fibers at or near the current OSHA Permissible Exposure Limit. These levels are significantly higher than those to which a residential population should be exposed. These

data are entirely consistent with investigations conducted by W.R. Grace concerning the handling of various vermiculite-bearing materials, which is reported in the Action Memorandum and subsequent Amendments and contained in the Site AR.

Investigations have clearly shown elevated levels of LA in the dust of residents' homes prior to cleanup (CDM, 2002, 2003a and 2003b; EPA Region 8, 2003). This dust contamination comes from several sources including, but not limited to: contaminated soil tracked into the homes; contamination that was picked up from the former vermiculite processing facilities and brought home on clothes and equipment; and releases of uncontained vermiculite insulation within homes. When disturbed, these LA-contaminated source materials may release LA fibers to indoor air resulting in complete exposure pathways. Actual exposure to these contaminated source materials may occur daily depending on the conditions and usage of the specific properties. Data contained in the reports in the Administrative Record indicate that activities performed by area residents and workers can result in elevated concentrations of respirable LA fibers in indoor air.

EPA has also determined that during a catastrophic event there is a significant threat of amphibole asbestos exposure from attics to the outside environment. In the last two years, there have been three house fires and one severe weather event involving homes containing VAI. In one of the fires, an explosion released VAI around the exterior of the home creating an exposure pathway to firefighters and passers-by. In the other two situations, flames breached the roofs and fibers were released to the atmosphere and surrounding properties. In the weather event, a microburst tore a roof off a home containing VAI, once again releasing visible vermiculite to the surrounding property.

LA fibers from the Libby mine site are hazardous to humans as evidenced by the abnormal occurrence of asbestos-related disease in area residents and workers. Workers and area residents exposed to asbestos fibers from the Libby mine site have been found to have increased mortality and morbidity from asbestos-related conditions, including asbestosis, pleural fibrosis, lung cancer, and mesothelioma. Asbestos-related lung diseases have also been observed in area residents with no direct occupational exposures, including family members of mine workers, and even in individuals with no known association with vermiculite mining or processing activities (Weis, 2001; ATSDR, 2003; Peipins et al., 2003; Miller, 2005; Whitehouse, 2008).

Past and current exposure to amphibole asbestos has had, and will continue to have, major adverse health impacts on Libby Site residents. Investigations performed by ATSDR have found an unusually high rate of cases of asbestos-related disease in this relatively small community. The death rate from asbestosis in Libby was at least 40 times that of the national average for the period from 1979-1998. The occurrences of disease are not limited to vermiculite-facility workers or their families, but are spread throughout the population. Medical care in Libby and Troy has historically been limited due to their isolated location and economic situation, thus reducing the chance of early detection and treatment of asbestos-related disease. (Montana Primary Care Health Professional Shortage Area List, 2001; Lincoln County Health Profile,

2002; U.S. Department of Health and Human Services, 2009). New diagnoses of ARD from past exposure to asbestos number two or three a month. A study in Libby of persons 18 years of age and older found that 1,186 of 6,668 participants (approximately 18% of those x-rayed) had abnormalities in the linings of their lungs (pleural abnormalities) (Peipins et al., 2003). The risk of pleural abnormalities increased with increasing age and increasing length of residence in the Libby area. The rate of pleural abnormalities found in groups within the United States who have no known asbestos exposures ranges from 0.2% to 2.3%.

The degree of asbestos contamination and the resulting medical impact is greater at Libby than that at other sites where vermiculite was shipped, processed or handled. There is documented widespread asbestos-related disease in Libby and Troy. An unfortunate convergence of factors has contributed to this situation:

1) There are multiple human exposure pathways in Libby and Troy;
2) Exposure has continued over a period of 60 or more years;
3) The vermiculite processing facilities were in very close proximity to the homes in Libby;
4) The meteorology of the area causes temperature inversions which trap air and asbestos carried by that air close to the ground;
5) The terrain further constrains contaminants within the steep walls of the valley, causing higher concentrations in localized areas;
6) The homes in these economically depressed communities are generally old, potentially leading to greater migration of contaminants into the living space from outdoors, attics and wall-spaces;
7) A high smoking rate among the people Libby and Troy increases the risk of asbestosis and lung cancer; and,
8) Medical care in Libby and Troy has historically been limited due to its isolated location and economic straits. Consequently, there was less chance of early detection for mesothelioma and appropriate care for asbestosis. That situation has recently changed with the CARD clinic.

There is an especially serious risk to tradesmen (electricians, craftsmen, etc.) in Libby and Troy due to the high number of homes impacted by LA. When working in homes in Libby and Troy, these individuals encounter multiple pathways of exposure including soil, air and indoor dust.

(ii). *High levels of hazardous substances or pollutants and contaminants in soils largely at or near the surface that may migrate.*

Soil contamination is prevalent throughout the Libby area. Region 8 has focused resources on cleaning up areas that were most highly contaminated, but many residential yards still contain measurable concentrations of LA at or near the surface (CDM, 2002, 2003a, 2003b). These soils, if unaddressed, can cause direct exposure when disturbed through normal activities and can contaminate the interiors of homes with LA-containing dust.

LA fibers from the Libby mine site are hazardous to humans as evidenced by the occurrence of asbestos-related disease in area residents and workers. Workers and area residents exposed to asbestos fibers from the Libby mine site have been found to have increased mortality and morbidity from asbestos-related conditions, including asbestosis, pleural fibrosis, lung cancer, and mesothelioma. Asbestos-related lung diseases have also been observed in area residents with no direct occupational exposures, including family members of mine workers, and even in those with no known association with the vermiculite mining or processing activities (Weis, 2001; ATSDR, 2003; Peipins et al., 2003; Miller, 2005; Whitehouse, 2008).

While most of the known larger contaminant sources and public areas (such as former vermiculite processing plants, schools, ball fields, and Riverside Park) have already been cleaned up, Region 8 recently discovered several additional contaminated "public" areas in Libby. These include the CVCC Golf Course, the ROW along Highway 37, the public compost pile at the county landfill and the creeks. Some of these properties presented immediate, unacceptable risks and were cleaned up quickly. For other properties, such as portions of the former Stimson Mill, the Highway 37 ROW, and the CVCC Golf Course, EPA has instituted interim containment measures such as fencing and/or issued public warnings. These properties are targeted for cleanup.

(iii). *The (lack) of availability of other appropriate Federal or state mechanisms to respond to the release.*

EPA believes that no person or local, state, or Federal agency is in the position, has the authority, or has the resources to independently and in a timely manner implement an effective response action to address the on-going threats presented at the Site. Other than CERCLA, there is no comprehensive Federal, state, or local program that provides both the authority and resources necessary to respond to a release of the scope presented in Libby at OUs 4 and 7. Under CERCLA as implemented by EPA under Executive Order 12580, EPA is the agency with the authority to address such releases.

B. Threats to the Environment

Work on an ecological risk assessment was initiated in September 2007. While currently no response actions are based on ecological impacts at the Site, this may change as data are collected. The Action Memorandum dated May 23, 2000 contains information about potential threats to the environment.

V. ENDANGERMENT DETERMINATION

The actual or threatened releases from this Site, if not addressed by continuation of the time-critical Removal Actions set forth in the original Action Memorandum and subsequent

Amendments, may present an imminent and substantial endangerment to public health or welfare or the environment. The original Action Memorandum for the Site, dated May 23, 2000 (EPA Region 8, 2000), as well as subsequent Amendments and the Administrative Record, describe in detail evidence of the toxicity associated with exposure to LA, the large number of human exposure pathways, the significantly elevated disease rate in Libby residents, and the variety of conditions present in and around Libby that could lead to continuing exposures.

Apart from this imminent and substantial endangerment, EPA Administrator Lisa P. Jackson found that the conditions in Libby associated with the release of amphibole asbestos from all sources, including VAI, present a public health emergency, pursuant to 42 U.S.C. § 9604(a)(4).

VI. EXEMPTION FROM STATUTORY LIMITS

The Libby Action Memorandum dated May 23, 2000 provided the documentation required to meet the NCP Section 300.415(b) criteria for a Removal Action. This Action Memorandum also provided EPA's determination regarding the applicability of CERCLA Section 104(c)(l)(A) [NCP Section 300.415(b)(5)(i)]. This provision allowed for using the emergency exemption from the $2 million and one year limits on removal actions. The two most recent site-wide Action Memorandum Amendments dated May 2006 and June 2006 expanded the scope of removal actions and raised the approved removal ceiling to $91,837,000. In addition, the recent August 2008 Action Memorandum for the Libby creeks raised the approved removal ceiling to $94,319,000[1]. It also found that conditions at the Site continued to satisfy the emergency exemption and met the CERCLA Section 104(c)(1)(C) [NCP Section 300.415(b)(5)(ii)] consistency exemption, which allows for a continued removal action over the cap when it is "otherwise appropriate and consistent with the remedial action to be taken." The conditions necessitating time critical removal action at the Libby Site still exist and continue to satisfy both the emergency and consistency exemptions from the statutory limits.

This Action Memorandum Amendment requests a ceiling increase under the already granted exemption from the statutory limits. This ceiling increase will support the continuation of the removal action originally authorized by the May 9, 2002, Action Memorandum Amendment, as amended by the two Action Memorandum Amendments from 2006 and the Action Memorandum Amendment signed in 2008. As discussed later in this Action Memorandum Amendment, this scope would now explicitly include properties in and around Troy, Montana (OU7), which meet the current Site Removal Criteria. An emergency exemption continues to be warranted to protect public health. Imminent and substantial risks to the public health of Libby residents continue to exist (Miller, 2005). Due to the prevalence of past and potential exposures, and the observed high rate of asbestos-related diseases, these risks are of an immediate and emergency nature. While conditions have improved considerably through EPA intervention, hundreds of properties

[1] The "Proposed Ceiling" of $94,319,000 listed in the Aug. 12, 2008 "Creeks" Action Memo was incorrectly calculated. The actual ceiling is $95,387,000.

meeting criteria set forth by EPA Region 8 for time-critical removal actions have yet to be addressed. Exposures to an already impacted population could potentially occur, and EPA is the only Agency with the resources to mitigate these conditions. In addition to meeting the criteria for an emergency condition, removal actions are also expected to be appropriate and consistent with future remedial actions, and thus continue to also meet the criteria for a consistency exemption from the $2 million and one year limits on removal actions as set forth in Section 300.415(b)(5)(ii) of the NCP. There are several reasons for this:

- LA, the contaminant of concern in Libby, is a mineral. There are no known viable treatment technologies that can diminish or reduce the toxicity of asbestos. To address exposures from asbestos, the most viable and commonly used physical cleanup options available are to remove it or to contain it. For time critical removal actions at the Site, Region 8 has used a combination of these approaches as appropriate.

- Because asbestos use was widespread in the past, the basic approach for asbestos abatement is well understood. There are a limited number of options available for cleanup. Most importantly, when asbestos is determined to be friable, the preferred mechanism to address potential exposures is to remove or contain the source.

- Investigations have shown that sources of LA, including, but not limited to, contaminated soil, vermiculite insulation, and vermiculite processing wastes are prevalent throughout Libby. Past and current investigations have clearly shown that, when disturbed, these sources can release LA to the air and have the potential to be released to the environment and contaminate indoor dust. This appears to be true even though LA concentrations in the source material are relatively low (Supplemental Quality Assurance Project Plan Report, EPA 2007). The primary objective of the removal actions is to remove or isolate these sources. Future site cleanups will continue to utilize removal and containment strategies.

- To ensure that Removal Actions are protective and consistent with future remedial actions, Region 8 has taken a conservative approach and adopted protocols that minimize the possibility of having to clean up a property twice. In general, EPA only begins a removal action when property conditions warrant a time-critical response. Furthermore, to reduce the likelihood of returning to a property, EPA also addresses lower levels of contamination found on the property. Initial post-cleanup sampling provided some validation of the efficacy and protectiveness of the cleanups (CDM, 2003c, 2004). This approach ensures that the worst risks are addressed first and that cleanups reduce the most prevalent exposure pathways, while the effort to determine what will be an effective final cleanup moves forward. The RI/FS for OU 4 and OU7 will evaluate current cleanup protocols as well as other options for cleanup.

VII. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Action Description

The Action Memorandum Amendment from May 2002 sets forth the basic scope of the current set of Removal Actions at the Libby Asbestos Site. While the basic need for cleanup and the general nature of the proposed actions has not changed, EPA has discovered that (1) more properties require cleanup than originally anticipated and (2) the difficulty and cost of cleanup is higher than originally anticipated. Currently, approximately 1,000 unaddressed properties in the Libby area meet the Removal Criteria for the Site. In addition, first-year, full-scale investigations of properties in and around Troy, Montana indicate that 102 of the approximately 800 properties screened there also require cleanup. If the analysis of the activity based sampling results indicates that risks in Libby and Troy are higher than currently thought, as preliminary review of the results indicate, EPA will likely revise the current removal action level for asbestos in soil. Consequently, the total number of properties requiring cleanup may change. In addition, EPA will continue the Environmental Resource Specialist service for the entire site.

The data from the Supplemental Quality Assurance Project Plan report indicates a need to modify the current Removal Actions approach. Based on the December 15, 2003, document titled: "*LIBBY ASBESTOS SITE RESIDENTIAL/COMMERCIAL CLEANUP ACTION LEVEL AND CLEARANCE CRITERIA TECHNICAL MEMORANDUM,*" once a property has met the current removal triggers, all LA that is detectable by Polarized Light Microscopy (PLM) is removed from the surface. However, there are some properties where visible vermiculite was left in place because LA was not detected by PLM. For properties that meet the current removal triggers, it was proposed that EPA remove all levels of LA detected by PLM from the property surface as well as all visible vermiculite material. Consequently, beginning in October 2006, EPA increased the rigor of the visual inspections performed on properties (see Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil, CDM 2006 in Site AR). It is hoped that this improved methodology will aid in the delineation of LA-bearing source materials. Also, beginning in October of 2006, EPA improved the methodology for collecting soil samples (going to 30-point composites instead of five-point composites). It is expected that combining these methods will provide EPA a much better field-usable tool for guiding its cleanups. This change in approach will be assessed by the Indoor and Outdoor ABS programs discussed earlier in this Action Memorandum Amendment.

Lastly, given the current state and planned future use, it is likely that additional Removal work will be required at OU1, OU2, OU5, and/or OU6.

B. Contribution to remedial performance

EPA finalized the listing for the Libby Site in October 2002. While cleanup at the Site continues to be conducted using removal authority, the Site was transitioned to the Region 8 Remedial

Program after final listing on the NPL. Information and experience gained during the removal actions are continually used to refine the cleanup action and to plan for future work. Likewise, as more information is learned about the nature of the contamination and the risks presented, adjustments to the cleanup approach will be made as necessary. It is expected that the cleanup approaches used during removal actions will be similar to, and consistent with, those used during remedial actions.

C. Description of alternative technologies

EPA attempts to employ the most appropriate technologies for addressing risks. At this time, there are no other known viable alternative technologies available for addressing asbestos.

D. EE/CA

No EE/CA is required.

E. Applicable or relevant and appropriate requirements

See the Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) identified and/or discussed in the original Action Memorandum dated May 23, 2000. There have been no new Federal or State ARARs that would be applicable to this Site developed since that time.

F. Project Schedule

The total number of properties currently identified as requiring cleanup (based on the December 2003 memo) including those in and around Troy, is now estimated to be 2,050, with 1,103 of those being completed as of December 18, 2008. Since the cleanup of residential/commercial properties began in earnest in 2003 (see Table 1), over the last six construction seasons the number of properties EPA has cleaned annually has ranged from 150 to 225. While EPA has become more effective in conducting LA removals, as discussed earlier in this Action Memorandum Amendment, EPA has seen an increase in the number of large properties in the Libby area. Preliminary reviews of the properties in the Troy area suggest that there is a mix of large and small properties that meet the current OU4/OU7 cleanup criteria. For planning purposes it is assumed that approximately $25,000,000 in special account/settlement funds will be required annually to cleanup Libby Asbestos Site properties in 2009 through 2013.

It is worth noting that the exact total number of properties to be addressed in and around Libby and Troy may not be known until the publication of a final Record of Decision (ROD). A final ROD is planned for 2013. The final ROD will incorporate the results of the toxicity studies and exposure assessment.

G. Estimated Costs

This ceiling increase is designed to cover projected 2009 through 2013 removal action costs and removal action expenditures accrued since the initiation of the project. Removal expenditures to date at the Site are currently estimated to be $165,000,000. Total removal expenditures for 2009 through 2013 are estimated to be $125,000,000. While the nature of cleanup has not fundamentally changed, the May 2002 Action Memorandum Amendment underestimated the scope, complexity, and cost of cleanup, especially with regards to interior cleaning and the removal of VAI. Likewise the two 2006 Action Memorandum Amendments anticipated that a ROD would follow soon thereafter.

This Amendment provides only a basic, cumulative breakout of the removal ceiling documented in the June 2006 Action Memorandum Amendment and the proposed removal ceiling (Table 2).

Table 2. Proposed Removal Project Ceiling

Category	Current Ceiling	Proposed Increase	Proposed Ceiling
Extramural Costs			
Property Cleanups	$93,769,000	$194,613,000**	$288,382,000
Intramural Costs	$ 1,168,000	$ 13,215,000	$ 14,383,000
Subtotal	$94,937,000	$207,828,000	$302,765,000
Contingency	$ 450,000***	$ 30,276,500****	$ 30,726.5,000
TOTAL	**$95,387,000***	**$238,104,500**	**$333,491,500**

* Please note that the "Proposed Ceiling" of $94,319,000 listed in the Aug. 12, 2008 "Creeks" Action Memo was incorrectly calculated. The 2008 memo reflected an intramural "proposed ceiling" of $100,000 rather than the correct value of $1,168,000.

** $165,000,000 (Expenses to date) – 95,387,000 (current ceiling) + $125,000,000 (est. 2009 - 2013 costs) {$165,000,000 - $95,387,000 + $125,000,000 = $194,613,000}

*** Calculated utilizing a 20% contingency

**** Calculated utilizing a 10% contingency ($302,765,000 * 0.1 = $30,276,500)

As documented in the May 2006 Action Memorandum Amendment (and in previous Action Memorandum Amendments), the Libby Asbestos Site has major expenditures that do not count against this Site ceiling. Through May 2009, these expenditures totaled approximately $52,000,000. Please note that amounts are approximate. Also note that these estimates do not include prejudgment interest, indirect costs and potential enforcement and litigation costs (including Department of Justice costs), which are not counted against the removal ceiling.

VIII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will result in continued public exposure to unsafe amounts of Libby Amphibole asbestos. This will increase the risk to public health and continue to burden an already impacted community.

IX. OUTSTANDING POLICY ISSUES

The Determination and Findings of Public Health Emergency may create the impression to the public that all attic insulation of this type constitutes a health threat. EPA believes this to be unfounded. The Libby Site is unique, involving multiple pathways and sources of exposure, in addition to attic insulation (see Section III. THE THREAT POSED BY ASBSETOS AT THE LIBBY SITE IS UNIQUE IN ITS SEVERITY AND SCOPE).

X. ENFORCEMENT

A separate Enforcement Summary has been prepared by the Site Attorney.

XI. RECOMMENDATION

This decision document represents the selected removal action for the removal of Libby Amphibole asbestos sources from properties at the Libby Asbestos Site in Lincoln County, Montana. The proposed removal actions have been developed in accordance with CERCLA as amended and are consistent with the NCP. The decision is based on the Administrative Record for the Site. Conditions at the Site continue to meet the NCP [40 CFR § 300.415(b)] criteria for removal actions. The NCP [40 CFR § 300.415(b)(5)(i)] and [40 CFR § 300.415(b)(5)(ii)] criteria for exemptions from the statutory limits that have been previously documented continue to exist. I recommend your formal approval of the proposed removal action ceiling increase.

Approve: Barry Breen, Principal Deputy Asst Admin. Date: 6/17/09
for Mathy V. Stanislaus
Assistant Administrator
Office of Solid Waste and Emergency Response

Disapprove: _____ Date: _____
Mathy V. Stanislaus
Assistant Administrator
Office of Solid Waste and Emergency Response

Attachment: Determination and Findings of Public Health Emergency

REFERENCES

Agency for Toxic Substances and Disease Registry (2003) Public Health Assessment, Libby Asbestos NPL Site. OU4: Screening Plant, Export Plant, Town of Libby, and Affected Libby Valley Residential and Commercial Properties, Lincoln County, Montana. EPA Facility ID: MT0009083840, U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation Superfund Site Assessment Branch.

CDM, 2002. Sampling and Analysis Plan, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4. April 30, 2002.

CDM 2003a. Sampling and Analysis Plan, Revision 1, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4. May, 2003.

CDM 2003b. Pre-Design Inspection Work Plan, Libby Asbestos Site, November 25, 2003.

CDM 2003c. Sampling and Analysis Plan Addendum, Post-Cleanup Evaluation Sampling, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4. December. 1, 2003.

CDM 2004. Technical Memorandum: Contaminant Screening Study, Post Cleanup Evaluation Sampling, Libby Asbestos Site, Operable Unit 4. September 1, 2004.

CDM 2007. Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil, October 12, 2006.

EPA Region 8, 2000. Action Memorandum, Libby Asbestos Site, May 23, 2000.

EPA Region 8, 2002. Action Memorandum Amendment, Libby Asbestos Site, May 8, 2002.

EPA Region 8, 2003. Draft Final US EPA Technical Memorandum: Libby Asbestos Site Residential/Commercial Cleanup Action Level and Clearance Criteria. December, 15, 2003.

EPA 2008. "Technical Support for the State and Tribal Air Quality 24-Hour Fine Particle (PM2.5) Designations," US EPA Office of Air Quality Planning and Standards, December 2008 see http://www.epa.gov/pmdesignations/2006standards/final/TSD/tsd_1.0_toc_intro.pdf

Lincoln County Health Profile, September 2002, see http://www.dphhs.mt.gov/PHSD/health-profiles/pdf/lincoln.pdf. as of June 10, 2009.

Miller, 2005. Amphibole Mineral Fiber Contamination of Various Source Materials in Residential and Commercial Areas of Libby Pose an Imminent and Substantial Endangerment to

Public Health. Memorandum from Aubrey Miller, USEPA Regional Medical Officer and Site. Dated 9/29/2005.

Montana Primary Care Health Professional Shortage Area List, dated November 2001, see http://www.dphhs.mt.gov/PHSD/Primary-Care/pdf/hpsa_lst.pdf, as of June 10, 2009.

Peipins LA, Lewin M, Campolucci S, Lybarger JA, Miller A, Middleton D, Weis C, Spence M, Black B, Kapil V. (2003) Radiographic abnormalities and exposure to asbestos-contaminated vermiculite in the community of Libby, MT, USA. *Environmental Health Perspectives* 111:1753-1759.

Rohs AM, Lockey JE, Dunning KK, Shukla R, Fan H, Hilbert T, Borton E, Wiot J, Meyer C, Shipley RT, LeMasters GK, Kapil V (2008) Low-level fiber-induced radiographic changes caused by Libby vermiculite: a 25-year follow-up study. *American Journal of Respiratory and Critical Care Medicine* 177:630-637.

Sullivan PA (2007) Vermiculite, respiratory disease, and asbestos exposure in Libby, Montana: update of a cohort mortality study. *Environmental Health Perspectives* 115:579-585.

US Department of Health and Human Services, Health Resources and Services Administration. Health Professional Shortage Areas by State and County, see http://hpsafind.hrsa.gov/HPSASearch.aspx, as of June 10, 2009.

US EPA, Region 8 Weis, 2001. Amphibole Mineral Fibers in Source Materials in Residential and Commercial Areas of Libby Pose an Imminent and Substantial Endangerment to Public Health. Memorandum from Christopher P. Weis, USEPA Regional Toxicologist, to Paul Peronard, USEPA On-Scene Coordinator for the Libby Asbestos Site. Dated 12/20/2001. US EPA, Region 8.

Whitehouse AC, Black CB, Heppe MS, Ruckdeschel J, Levin SM (2008) Environmental exposure to Libby asbestos and mesotheliomas. *American Journal of Industrial Medicine* 51:877-880.

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