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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/Region08

LIBBY #3

Ref: 8EPR-SR

## ACTION MEMORANDUM AMENDMENT

**SUBJECT:** Action Memorandum Amendment for the Time-Critical Removal Action at the Libby Asbestos Site – Libby, Lincoln County, Montana.

**FROM:** Robert E. Roberts
Regional Administrator

**TO:** Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

**THROUGH:** Michael B. Cook, Director
Office of Emergency and Remedial Response

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

## I. INTRODUCTION

The purpose of this Action Memorandum Amendment is to: (1) request and document Headquarters approval of a ceiling increase for the Libby Asbestos Site (Site) in Lincoln County, Montana, (2) request and document a continued emergency exemption from the $2 million and one year limits on Removal Actions as described in National Contingency Plan (NCP) Section 300.415(b)(2), and (3) request and document a consistency exemption from the $2 million and one year limits on Removal Actions as described in National Contingency Plan (NCP) Section 300.415(b)(2). The previous Action Memorandum Amendment dated May 8, 2002 set forth the need and scope for additional cleanup activities at the Site. Those cleanup activities are progressing and are still considered to be of an emergency nature. However, the difficulty and expense of cleanup is greater than anticipated and an additional removal ceiling is required to continue the necessary emergency response actions. EPA Region 8 (Region 8) continues to conduct cleanup while concurrently completing a remedial investigation and working toward publication of a Record of Decision (ROD).

## II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The initial Action Memorandum and subsequent Amendments provide basic descriptions of the vermiculite mine, vermiculite processing facilities, several contaminated properties, and the conditions found throughout the Libby Valley. Since the date of the previous Action Memorandum Amendment of May 8, 2002, the Site became final on the National Priorities List (NPL) in October 2002. Additional investigation has focused on two major aspects: (1) evaluating conditions at individual residential and commercial properties throughout Libby as necessary to implement the response actions set forth in May 2002, and (2) collecting data necessary to complete a Remedial Investigation/Feasibility Study (RI/FS) and publish a ROD. While the total number of properties requiring remediation will remain uncertain until a ROD is published, Region 8 currently estimates that approximately 1400 residential/commercial properties will require response. This is significantly higher than estimates presented in the May 2002 Action Memorandum Amendment. Approximately 450 properties have been completed to date.

The Libby Asbestos Site is currently made up of eight operable units (OUs). OU00 and OU4 represent site-wide operable units for Removal Actions and Remedial Actions, respectively. OUs 1,2,3,5 and 6 are described in the next section. OU7 represents Troy, MT. Troy is located near Libby and due to its history and location, is suspected of containing similar contamination to Libby, although generally smaller in scope. The Montana Department of Environmental Quality (MDEQ) and EPA signed a cooperative agreement which calls for MDEQ to begin investigations and screening of individual properties in 2006. Background work will begin in 2005. Troy is not addressed in this Action Memorandum Amendment.

B. Other Actions to Date

The previous Action Memorandum Amendment provided a description of various activities at the Site and their progress as of May 2002. These activities were completed or continued as necessary and additional activities were started. For activities or locations that were NOT completed as of May 2002, an updated summary is found below:

| PREVIOUS ACTIONS | |
|---|---|
| **Location** | **Action Description and Updated Status** |
| Export Plant | The Export Plant is Operable Unit 1. Pursuant to a Unilateral Order from EPA, W.R. Grace demolished and disposed of four buildings on the property and removed approximately 17,500 cubic yards of contaminated soil and debris from the property. Region 8 completed remaining demolition work at the property of one building in 2002. The lumber business formerly operating at this location was relocated by W.R. Grace in 2003 to a new location in Libby. Removal work here is complete. |

| | |
|---|---|
| Screening Plant | This property consists of five distinct, contiguous parcels and makes up Operable Unit 2. **(1) Raintree Nursery.** Region 8 completed cleanup of this parcel in 2003. Approximately 17 acres were addressed and 250,000 cubic yards of contaminated debris and soil were removed. Restoration of this parcel is essentially complete, with only punch-list items remaining for 2005. **(2) North Side Parker Property.** Region 8 completed cleanup here in 2004, addressing approximately four additional acres. **(3) Flyway Property**. Region 8 completed approximately ¼ 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 50,000 cubic yards of soil were removed. **(4) KDC Bluffs Property.** Several areas of the KDC Bluffs parcel were cleaned up by EPA in 2001; some lower level contamination remains which will be evaluated for future Remedial Actions. **(5) Wise Property.** Small property between Raintree Nursery and the Flyway that still requires cleanup. The only extensive removal work remaining consists of the Wise property and some right of way along Highway 37 near the Flyway. This work is scheduled to occur in 2005. |
| Rainy Creek Road | Rainy Creek Road and the mine itself make up Operable Unit 3. Rainy Creek Road is a forest service access road to the former vermiculite mine. Highly contaminated. Site access remains restricted. Nearly half the road was paved and semi-permanent decontamination stations were installed to facilitate soil disposal at the former mine. Soil disposal is ongoing. Operable Unit 3 is targeted for a future Remedial Investigation/Feasibility Study (RI/FS). EPA intends to begin negotiations with W.R. Grace in 2005 regarding future conduct if the RI/FS. The RI/FS will help determine the need for future Remedial Actions. |
| Libby High School and Middle School Tracks | Cleanup completed by 2002. Both tracks were restored in 2003. Work is complete. |
| Siefke Property | Highly contaminated, large residential property identified early. Cleanup was completed in 2002 and restoration was completed in 2004. |
| Johnson, Sanderson, Temple, Struck, Rice, Fuhlendorf, Spencer, and Westfall properties. | Highly contaminated residential properties identified early. All cleanup and restoration was completed by 2003. |
| Champion Haul Road | Cleanup was completed in 2003. |
| **NEW ACTIONS** | |
| **Location** | **Action Description and Updated Status** |

| | |
|---|---|
| Riverside Park and Boat Ramp | Subsurface contamination was encountered during construction of a new park and boat ramp by the City of Libby in 2003. The parcel is contiguous to the former screening plant. EPA halted construction and cleaned the parcel in late 2003. Approximately 15 acres of soil were excavated to an average depth of two feet. Cleanup and restoration is complete. |
| Lincoln County Landfill Asbestos Cell | Region 8 constructed and operates a new cell at the Lincoln County Landfill that is used for disposal of vermiculite insulation and other construction debris. Construction of the cell was completed in 2003. The cell was expanded in 2004. Disposal operations are ongoing. |
| Burlington Northern Santa Fe Rail Yard | The Burlington Northern Rail Yard is Operable Unit 6. Pursuant to an Administrative Order on Consent with EPA, BNSF began cleanup of the contaminated rail yard in 2003 but had to cease work due to complexities with soil removal below the tracks. Work began again in 2004, most tracks were removed, and removal work is now complete. Most contaminated soils were removed, but some contamination was capped in place. |
| Former Stimson Lumber Mill | The former Stimson Lumber Mill represents Operable Unit 5. Region 8 conducted extensive sampling of the former lumber mill and has identified two primary areas requiring cleanup. The first of these, the former central maintenance building, is scheduled to be cleaned up in 2005. The second, a former nursery area, was fenced off in 2004 and is to be further investigated in 2005. |
| Systematic screening and cleanup of individual residential and commercial properties in Libby Valley | As the first phase of the Remedial Investigation (RI), and to gather the information required to make decisions on which properties require emergency response action, Region 8 inspected and sampled approximately 3500 properties in 2002, 2003, and 2004. Most inspection is complete, though additional RI sampling is planned for 2005. As of December, 2004, approximately 450 emergency properties have been cleaned up. Work is ongoing. |

C. Current Actions

Region 8 is continuing systematic investigation and cleanup of individual properties throughout the Libby area described in the May 2002 Action Memorandum Amendment. There are multiple objectives to the investigation: (1) identify properties that meet criteria for emergency response and require immediate cleanup, (2) collect information and data necessary to complete an RI/FS, Baseline Risk Assessment, and ROD, and (3) identify properties that may require future Remedial Action based upon criteria that will be set forth in the ROD.

Based on current knowledge, Region 8 *estimates* that at least 1400 residential/commercial properties will require cleanup, of which approximately 950 remain (450 emergency response properties were cleaned up through 2004 and approximately 170-200 are planned for 2005). The 1400+ figure includes properties that meet criteria for emergency response as well as estimates of

the number of properties that may meet future criteria established for Remedial Action. While a large percentage of properties remaining to be cleaned up have conditions justifying emergency response, cleanup of these properties using Removal authority will generally continue only until publication of ROD, at which time cleanup will continue using Remedial authority. Remedial authority will then be used to clean up both properties that meet emergency response criteria but are not yet complete, and properties that may meet future criteria established for Remedial Action. (Note that EPA may encounter situations in the future for which Removal Actions are appropriate, even after a ROD is published). Region 8 expects to publish a ROD for residential/commercial cleanup (Operable Units 00 and 04) in early 2006. The ROD will establish final cleanup levels and criteria which will enable Region 8 to more accurately quantify the total number of properties requiring cleanup.

Region 8 has made significant progress toward a ROD despite both limited funding and the extremely complex nature of asbestos analysis and risk assessment. A few critical activities are highlighted below:

- In 2002, 2003, and 2004, Region 8 inspected and sampled approximately 3500 properties in the Libby area. We inspected for vermiculite insulation, visible vermiculite in soils, and collected soil and dust samples. Because contamination was generally placed at particular properties through human activities, rather than being spread uniformly by air or water, there was no clear pattern to the contamination. This warranted that each property in Libby be inspected. The information collected was used to determine which properties warranted emergency response and for defining the nature and extent of contamination across the Site.
- In 2002 and 2003, Region 8 designed and began conducting a Performance Evaluation (PE) Study to test the efficacy of existing and new analytical procedures for measuring asbestos in soil. Existing analytical methods are often not cost effective and are often unable to detect asbestos in soil at levels that are of likely health concern. The PE Study was extremely complex, primarily because some methods had to be modified and developed specifically for Libby and there were no existing "standards" to test the methods against. Most of the PE Study is complete. The study helped Region 8 develop and validate a cost-effective, new analytical method tailored to Libby soils. This method was used to analyze over 12,000 soil samples collected in residential yards.
- In 2003, Region 8 published the Draft Final Action Level and Clearance Criteria Technical Memorandum, which set forth additional screening level risk assessment calculations for Libby and the criteria for determining if a property warrants emergency response cleanup (EPA Region 8, 2003).
- In 2002, 2003, and 2004 Region 8 has worked extensively with EPA Headquarters and other EPA Regions in reviewing and updating the IRIS asbestos risk model. Developing and adopting a more accurate and accepted risk model is necessary for completion of a credible Baseline Risk Assessment in Libby.
- In 2004, Region 8 designed and conducted a post-cleanup sampling program to test the efficacy of the residential/commercial cleanup approach. This data is critical to

development of final cleanup levels and protocol. (CDM, 2003c, 2004)

- Region 8 is currently conducting sampling to fill in remaining data gaps, focusing on low concentration exposures that will likely be the subject of future Remedial Actions.

D. State, Local, and Other Authorities Roles

There are no significant changes in roles from the May 8, 2002 Action Memorandum Amendment, other than the Montana Department of Environmental Quality assuming the lead role for the investigation and screening of Troy, MT.

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

**A. Despite significant progress on cleanup, conditions in Libby still present significant threats to public health. At least two conditions set forth in Section 300.415(b)(2) of the NCP for determining the appropriateness of a removal action continue to be present in the Libby area:**

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

- Libby asbestos contaminated source materials (e.g., indoor dust, yard and garden soils, driveway materials, vermiculite insulation) are still found throughout the community. The Action Memorandum Amendment dated May 8, 2002 described these conditions in detail (EPA Region 8, 2002). Subsequent investigations have shown that about one-third of the approximately 4000 properties in the Libby area contain varying levels of contaminated source materials, such as vermiculite insulation or contaminated soils (CDM, 2002 and 2003a)

- Investigations have clearly shown elevated levels of Libby asbestos in the dust of resident's homes. (CDM, 2002, 2003a and 2003b; EPA Region 8, 2003) This dust contamination comes from several sources including but not necessarily limited to: contaminated soil at the property that is tracked into the home; contamination that was picked up at former vermiculite processing facilities in the past and brought home on clothes and equipment; releases of vermiculite insulation from the attic or walls.

- These asbestos contaminated source materials, when disturbed, may release asbestos fibers to the 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. Activities similar to those that are likely to be performed by area residents and workers can result in elevated concentrations of respirable asbestos fibers in air. Further, concentrations of fibers in air generated by disturbance of contaminated

source materials may exceed OSHA occupational standards and EPA cancer risk guidelines (EPA Region 8, 2003; Weis, 2001; Miller, 2005).

- Asbestos 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; Miller, 2005).

**(iv). 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 Libby asbestos 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 interior of homes with asbestos-containing dust. Screening level risk calculations by Region 8 suggest that the contamination of indoor dust by outdoor soils is one of the most important exposure pathways in Libby (EPA Region 8, 2003).

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 has discovered several new "public" areas of contamination in Libby as well. These include J. Neils Park, the public golf course, the St. John's Hospital helipad, the right-of-way along Highway 37, the public compost pile at the county landfill, and others. Some of these properties present immediate, unacceptable risks and will be cleaned up quickly. Others, due to lower contamination levels or less likelihood of exposures, have been isolated and/or earmarked for possible future Remedial Action.

## IV. ENDANGERMENT DETERMINATION

The actual or threatened releases from this Site, if not addressed by continuing to implement the response actions set forth the in the original Action Memorandum and subsequent Amendments, may present an imminent and substantial endangerment to public health, welfare, or the environment. The original Action Memorandum for the Site, dated May 23, 2000 (EPA Region 8, 2000), as well as subsequent Amendments, describe in detail the toxicity associated with Libby asbestos, the significantly elevated disease rate in Libby residents, and the variety of

conditions present in and around Libby that lead to continuing exposures (Weis, 2001; Miller, 2005).

## V. EXEMPTION FROM STATUTORY LIMITS

The original Libby Action Memorandum dated May 23, 2002 provided the documentation required to meet the NCP Section 300.415(b)(2) criteria for a Removal Action and the NCP Section 300.415(b)(5)(i) emergency exemption from the $2 million and one year limits on Removal Actions. The most recent Action Memorandum Amendment dated May 2002 expanded the scope of Removal Actions and raised the approved removal ceiling to $55,635,000. The conditions necessitating Removal Actions and the emergency exemption still exist. The difficulty and costs of mitigating these conditions have proven higher than originally estimated. Region 8 is formally requesting an additional increase to the removal ceiling in order to continue and complete work approved in the May 2002 Amendment.

Removal Actions being conducted in Libby are also expected to be consistent with future Remedial Actions, and thus 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:

- Libby Asbestos, the contaminant of concern in Libby, is a naturally occurring mineral. There are no known viable treatment technologies that can diminish or reduce the toxicity of asbestos. To address exposures from asbestos, the only cleanup options available are to remove it or to contain it. For Removal Actions at the Site, Region 8 has used a combination of both 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 the source.
- Investigations have shown that sources of Libby asbestos, including, but not limited to, contaminated soil, vermiculite insulation, and vermiculite processing wastes are prevalent throughout Libby. Past investigations have clearly shown that, when disturbed, these sources can release asbestos to the air and have the potential to contaminate indoor dust. The primary objective of the Removal Actions in Libby is to remove or isolate these sources. Any future Remedial Actions must also employ source removal as a key component of cleanup and response.
- To EPA's knowledge, large-scale removal of vermiculite insulation had not been attempted prior to EPA's cleanup in Libby. Due to the highly friable and pervasive nature of this material, it presented numerous technical challenges. Various cleanup techniques for dealing with vermiculite insulation and other media were evaluated during the initial emergency response cleanups of residential/commercial properties. Region 8 used this experience to evaluate the efficacy of various approaches and to refine our cleanup strategy. This information will be used in the RI/FS.
- While the *basic* approach to asbestos cleanup is well understood and relatively simple,

the degree to which cleanup is necessary, and exactly which situations require cleanup, is *not* well understood or simple. A large degree uncertainty exists in the scientific community as to (1) what constitutes a "safe" level of asbestos in soil, dust, and other media and (2) how to effectively measure these levels. This makes establishment of site-specific action levels extremely challenging. As described in Section II (C) of this Amendment, EPA is currently working to resolve these difficult issues both at Libby (in the RI/FS), as well as at other asbestos sites across the country. However, to ensure that Removal Actions are protective and consistent with future Remedial Actions at Libby, Region 8 has taken a conservative approach and adopted protocols that we believe will ensure we will not have to clean up a property twice. In general, we only start cleanup if a property has conditions that warrant emergency response, but once a cleanup occurs, we remediate to a level expected to be protective for the long-term. Post-cleanup sampling has validated the efficacy and protectiveness of the cleanups (CDM, 2003c, 2004). This approach ensures the worst risks are addressed first and is cost-effective, protective, and well accepted by the community and the State of Montana.

## VI. PROPOSED ACTIONS AND ESTIMATED COSTS

### A. Proposed Action Description

The Action Memorandum Amendment dated May 2002 set forth the proposed actions. While the basic need for cleanup and 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.

### B. Contribution to remedial performance

The Site was made final on the NPL 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 in directly after final listing on the NPL. Collection of information and data necessary to perform an RI, and ultimately to write a Record of Decision, is occurring concurrently with the conduct of the Removal Actions. Information and experience gained during the removal actions is used to continually refine the process 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 are made as necessary. The most contaminated properties are targeted first, and as discussed in Section V of this Amendment, EPA has tried to ensure that properties are cleaned to a sufficient level such that cleanup must only occur once. This approach is protective as well as cost effective. It is expected that the cleanup approaches used during Remedial Actions will be similar to, and consistent with, those used during Removal Actions.

### C. Description of alternative technologies

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

D. EE/CA

No EE/CA is required.

E. Applicable or relevant and appropriate requirements

See the Federal and State ARARs identified and/or discussed in the original Action Memorandum dated May 23, 2000.

F. Project Schedule

The total number of properties requiring cleaned up will not be known until publication of a ROD, expected in late 2005 or early 2006. Based on current knowledge, Region 8 estimates that approximately 1400 properties will require cleanup, of which approximately 450 have already been addressed. While a large percentage of remaining properties will meet the conditions set forth in the May 2002 Action Memo Amendment for emergency response, emergency response cleanup using removal authority will continue only until publication of a ROD, at which time cleanup will continue using remedial authority. Remedial authority will then be used to clean up both classifications of properties: those that meet emergency response criteria but are not yet complete, and those that may meet future criteria established for remedial action. (Note that EPA may encounter situations in the future for which removal actions are appropriate, even after a ROD is published). Region 8 expects that approximately 170-200 properties can be cleaned up per year at current funding levels. The overall project schedule is contingent upon funding and the total number of properties requiring cleanup, but based on current knowledge, the current funding situation, and the actual date of a ROD, Region 8 estimates that approximately 1-2 years of emergency response and 4-6 years of Remedial Actions remain. 170-200 properties are scheduled to be completed in 2005.

G. Estimated Costs

The ceiling increase is projected to cover two years of additional Removal Actions at production rates similar to those in 2003 and 2004 (170-200 properties expected to be cleaned per year). 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 vermiculite insulation. Because of this, Region 8 has expended funds quicker than anticipated and the job is not complete. However, after two years of investigation and cleanup, Region 8 is able to more accurately forecast cleanup requirements, both on a per property basis and overall. Because of this increased accuracy, and for simplicity, this Amendment provides only a basic, cumulative breakout of existing and proposed removal ceilings (Table 1), as well as a summary of other external costs that have been incurred that do not count against the removal ceiling (Table 2). Again, it is expected a ROD will be published within two years, and cleanup will switch to remedial authority.

Table 1. Proposed Site Ceiling

| Category | Approved Ceiling (Action Memo Amendment dated May 2, 2002) | Proposed Ceiling Increase | Proposed Total |
|---|---|---|---|
| Extramural Costs | $45,525,000 | $30,000,000 | $75,525,000 |
| Contingency @ 20% of Extramural | $9,100,000 | $6,000,000 | $15,100,000 |
| Intramural Costs | $960,000 | $100,000 | $1,060,000 |
| **TOTAL** | **$55,635,000** | **$36,100,000** | **$91,735,000** |

Table 2. Other major expenditures not counted against ceiling. Note that amounts are approximate.

| Task | Previous Expenditures Through CY 2004 (approximate) | Planned Expenditures CY 2005-2006 (approximate) |
|---|---|---|
| Phase I and Phase II Removal Sampling Investigations | $8,100,000 | 0 |
| Medical Screening Support | $500,000 | 0 |
| Contaminant Screening Study (first phase of Remedial Investigation) | $5,000,000 | $500,000 |
| Remedial Investigation & Risk Assessment | $2,500,000 | $1,500,000 |
| Performance Evaluation/ Analytical Methods Study | $1,000,000 | $200,000 |
| USGS Support | $2,000,000 | 0 |
| Community Involvement | $500,000 | $500,000 |
| Database Creation and Management | $2,000,000 | $1,500,000 |
| **TOTAL** | **$21,600,000.00** | **$4,200,000.00** |

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

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

## VIII. OUTSTANDING POLICY ISSUES

There are no new policy issues or considerations.

## IX. ENFORCEMENT

A confidential summary of Enforcement Actions is included as a separate document.

## X. RECOMMENDATION

This decision document represents the selected Removal Action for the removal of Libby asbestos sources from targeted homes, businesses, and public buildings 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 meet the NCP [40 CFR § 300.415(b)] criteria for a Removal Action, and the NCP [40 CFR § 300.415(b)(5)(i)] and [40 CFR § 300.415(b)(5)(ii)] criteria for exemptions from the statutory limits. I recommend your formal approval of the proposed Removal Action ceiling increase.

Approve: _____ Date: _____
Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

Disapprove: _____ Date: _____
Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

## REFERENCES


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.

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

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 Toxicologist, to Jim Christiansen, USEPA Remedial Project Manager for the Libby Asbestos Site. Dated 6/27/2005. 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.




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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/Region08

# DRAFT MEMORANDUM

6/27/2005

**SUBJECT:** Amphibole Mineral Fiber Contamination of Various Source Materials in Residential and Commercial Areas of Libby Pose an Imminent and Substantial Endangerment to Public Health

**FROM:** Aubrey Miller MD, MPH
Senior Medical Officer / Science Support Coordinator
Libby Asbestos Site

**TO:** Jim Christiansen, Remedial Project Manager
Libby Asbestos Site

## I. PURPOSE

This memorandum presents the rationale for determination of imminent and substantial endangerment to public health from asbestos contamination in various types of source materials at residential and commercial properties in and around the community of Libby, Montana. This memorandum confirms and extends similar issues and conclusions discussed in previous endangerment memoranda prepared by Dr. Chris Weis, former Science Support Coordinator, for the Libby Site (Weis, 2000; Weis, 2001a, Weis, 2001b).

## II. SUMMARY OF FINDINGS

1) Asbestos fibers of the type that occur in vermiculite ore from the mine in Libby are hazardous to humans when inhaled.

2) Asbestos mineral fibers that are characteristic of those that occur in materials from the Libby mine are present in a variety of different source materials at residential and commercial locations in and around the community of Libby. Outdoor source materials include yard soil, garden soil, driveway material, and assorted mine waste materials, while indoor source materials include house dust and vermiculite insulation.

3) Disturbance of asbestos-contaminated source materials by activities similar to

those that are likely to be performed by area residents and workers can result in elevated concentrations of respirable asbestos fibers in air.

4) The concentrations of fibers in air generated by disturbance of source materials may exceed OSHA occupational standards (OSHA 1994) and EPA cancer risk guidelines (EPA 1986). Further such guidelines may underestimate the actual risk for adverse health outcomes associated with airborne exposure to Libby Amphibole.

On this basis, it is concluded that: a) contaminated source materials at this site, such as soil and soil-like media, dust, and vermiculite insulation, contain elevated concentrations of asbestos minerals and can serve as a source of on-going release of hazardous fibers to air, b) disturbance of LA contaminated source materials will result in a complete pathway for human exposure, and c) it is necessary to reduce or eliminate pathways of exposure for residents, workers, and others who may disturb these contaminated source materials.

## III. BACKGROUND

Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana, in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased.

Vermiculite ore bodies on Zonolite Mountain contain amphibole asbestos at concentrations ranging up to nearly 100% in selected areas (Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI; 1928), no commercial production of asbestos from the Libby mine is reported. During early mining operations, airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987a). Historical airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cc established by OSHA in 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is recognized as being associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Residual fiber contamination from the subject facilities continues to present potential exposure to workers, residents, and visitors at these facilities, but is presently being addressed under removal authorities provided in the Comprehensive Environmental Response Compensation and Liability Act Section 104 (CERCLA or Superfund). These actions by the U.S. Environmental Protection Agency Region 8 office in Denver, CO began on November 22, 1999 and continue today. The

investigative team is working closely with Local, State, and other Federal Agencies to determine the nature and extent of mineral fiber contamination throughout Libby, and to take appropriate action to protect the health of current residents and workers.

## IV. ENDANGERMENT RATIONALE

Threats to public health have been clearly demonstrated at the Libby site with regard to: 1) disease from airborne exposure to Libby Amphibole fibers, and 2) exposures resulting from disturbance of contaminated source materials.

### A. Disease from Exposure to Libby Amphibole Fibers

*Exposure to airborne asbestos fibers resulting from disturbance of ore products or wastes from the Zonolite Mountain in Libby, Montana is hazardous to human health.*

The risk of developing an asbestos-related disease depends on fiber characteristics, the level and duration of exposure, time since first exposure, the individual's smoking history, and the individual's response to the presence of asbestos fibers in pulmonary tissue. In general the longer a person is exposed to asbestos and the greater the intensity of the exposure, the greater the likelihood for asbestos-related health problems. While some forms of disease, especially cancers, may take as long as forty years to develop, there is concern that even short-term exposures may have significant adverse health impacts. This is particularly true for children, in whose lungs the presence of fibers may be able to exert their toxic effects for many more years as compared to exposures during adulthood.

#### 1. Libby Site Exposures and Disease

The health effects from airborne exposure to the more common commercially used and regulated asbestos mineral forms (chrysotile, tremolite, actinolite, anthophyllite, amosite, crocidolite) include: (1) pleural disease (plaques, diffuse thickening, calcifications, and pleural effusions), (2) interstitial disease (asbestosis), (3) lung cancer, and (4) mesothelioma (a rare cancer of mesothelial cells in the pleura or peritoneum). The observed health effects associated with exposure to asbestiform amphibole fibers (Libby Amphibole) (Meeker, 2003) at the Libby site have been well documented and are clearly consistent, and perhaps even more severe, than those illnesses seen with the more common asbestos mineral exposures (as noted below).

Studies performed in the early 1980's by researchers from McGill University (McDonald 1986a-b) and the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) (Amandus 1987a-c) found that former employees of the Libby vermiculite mine had significantly increased pulmonary morbidity and mortality from asbestosis and lung malignancies. Researchers at NIOSH who studied the annual chest x-rays of mine and mill workers with at least 5 years tenure (between 1975 and 1982) also found an increased prevalence of the radiographic abnormalities associated with asbestos-related disease. A recent follow-up study of Libby vermiculite workers that were previously evaluated in the 1980's, found that "this small cohort of vermiculite miners, exposed to amphibole fibers in

the tremolite series, has suffered severely from both malignant and non-malignant respiratory disease"(McDonald, 2002). The overall proportionate mortality among the group for mesothelioma (4.2%) was extremely high, being similar to that seen for crocidolite (considered by many to be the most toxic form of asbestos) miners in South Africa (4.7%) and Australia (3.9%) (McDonald 2002; McDonald 2004). For comparison, the age-adjusted incidence of mesothelioma in the United States (1992-2002) was about 0.001% (1 case per 100,000) with the occurrence of cases being extremely rare prior to age 50 (SEER, 2005).

More recent studies completed at the Libby site have also found increased mortality and morbidity among former workers, as well as, others in the community without any direct occupational exposures to the mine or processing activities. A mortality study conducted by investigators from the CDC, Agency for Toxic Substances and Disease Registry (ATSDR) found markedly elevated death rates of asbestosis, lung cancer, and mesothelioma for the Libby Community for the 20-year period examined (1979–1998). Mortality from asbestosis was approximately 40 times higher than the rest of Montana and 60 times higher than the rest of the United States (ATSDR 2000, ATSDR 2002a).

Large-scale medical screening of over 7300 individuals that worked or lived in Libby for at least six months prior to 1990, found significantly increased rates of asbestos-related radiologic abnormalities. Approximately 18% (1186/6668) of the participants with asbestos-related pleural abnormalities were identified by at least 2 out of 3 B-readers. The prevalence of pleural abnormalities increased with increasing exposure pathways, ranging from 6.7% for those who were not able to identify any specific exposure pathways aside from living in Libby to 34.6% for those who reported 12 or more specific exposure pathways. The majority of individuals (>70%) with pleural abnormalities did not directly work for the mine or processing operations, or with any secondary contractors for the mine (Peipins 2003, EHP 2004). Findings of asbestos-related pleural disease were also documented in a case-series involving a small group of Libby residents with no history of any occupationally-related asbestos exposures (ATSDR 2002b). In another recent study, computed tomography (CT) scans were evaluated as a screening tool for detecting asbestos-related lung abnormalities in persons who had indeterminate chest x-rays (only 1 of the 3 B-readers reported pleural abnormalities on the participant's chest x-ray) during the medical screening in Libby, Montana. These were individuals that were not counted by investigators as having "asbestos-related abnormalities" for the analysis or reporting of data from the medical screening. Of the 353 participants with indeterminate chest x-rays (55 former vermiculite mine and mill workers, 99 household contacts, 199 persons with exposure to vermiculite due to past direct recreational behaviors), CT scans detected pleural abnormalities in 98 persons or 28% of all those tested (ATSDR 2003), indicating that the actual prevalence of asbestos-related pleural disease reported in the community by Peipins et. al.(Peipins 2003), is likely to be conservative.

A recent expert review of the medical literature by the American Thoracic Society (ATS) that focused on "non-malignant asbestos disease" reported the following findings with regard to asbestos-related pleural disease: 1) slow progression of asbestos-related pleural disease is typical, with up to 85% of heavily exposed workers and 17% of environmentally exposed populations showing progression of their disease over time, 2) the presence of asbestos-related pleural disease

has been associated with a greater risk of mesothelioma and lung cancer compared with subjects of comparable histories of asbestos exposures who do not have such abnormalities, and 3) epidemiologic studies have shown a significant reduction in lung function attributable to both circumscribed and diffuse pleural fibrosis, even in the absence of radiological evidence of interstitial fibrosis (asbestosis) (ATS 2004). Such findings of disease progression and loss of pulmonary function has also been recently documented for individuals with exposure to Libby Amphibole. This study evaluated 123 patients (86 former workers, 27 family members of former workers, 10 non-occupational exposures) with exposure to Libby Amphibole for changes in pulmonary function over time. Marked progressive loss of pulmonary function was found in 94 (76%) of these patients, with the majority having predominantly only pleural disease (Whitehouse 2004).

**2. Offsite Exposures and Disease**

In addition to the Libby site, offsite occupational exposures to Libby Amphibole associated with processed vermiculite ore and vermiculite products (having much lower levels of contamination) have also documented the extremely hazardous nature of this material. A study of 513 workers at a manufacturing plant in Marysville, Ohio that handled processed vermiculite ore found an increased prevalence of shortness of breath, pleuritic chest pain, and radiographic pleural abnormalities in association with cumulative asbestos exposures as low as 1-10 fibers/ml-year (Lockey, 1984). Preliminary results from a recent follow-up evaluation of 236 of the original Ohio workers found that the overall prevalence of pleural plaques had increased from 4% among the overall cohort in 1980 to 26.3%. The increase in pleural changes was found in both low and higher exposure categories and this increase was significantly associated with cumulative exposure ($p<0.05$). Percent of workers with pleural changes increased in relation to cumulative exposure quartiles: 1st quartile 5.1% (0.0007-0.361 fiber/cc-year), 2nd quartile 22.0% (0.362-1.042 f/cc-yr), 3rd quartile 33.9% (1.043-2.564 f/cc-yr), and 4th quartile 44.1% (2.565-28.11 f/cc-yr). The manufacturing facility had ceased using Libby vermiculite ore in 1980 and subsequently used vermiculite ore from other sources that reportedly contained no asbestos or asbestiform minerals (Rohs, 2005). Progressive disease from exposure to Libby Amphibole fibers was also noted in a case study that reported the occurrence of fatal asbestosis in an individual 50 years after working at an offsite vermiculite processing plant for a few months at about age 17 (Wright, 2002). In addition to occupational exposures, cases of fatal non-occupational asbestos disease associated with exposures to contaminated vermiculite have been reported. In one case, exposures that stemmed from playing for a few years as a child in contaminated vermiculite waste materials around a former Libby vermiculite processing facility was associated with the development of asbestosis and fatal lung cancer (Srebro, 1994). In another case, exposure to vermiculite attic insulation was associated with the development of fatal mesothelioma in a homeowner (Harashe v. Flintkote, 1993).

**B. Asbestos Exposures Resulting From Contaminated Bulk Materials**

*Disturbance of soils, dusts, insulation, garden products, and other bulk materials contaminated with asbestiform minerals from Libby, Montana may result in a complete pathway for airborne human exposure. Depending on various environmental factors (e.g., room ventilation, wind, humidity) and the nature of the activities, airborne exposures may exceed available OSHA*

*standards (OSHA 1994) and EPA health guidance (EPA 1986).*

**1. Soils & Dust**

Asbestos fibers in soil or dust are not inherently hazardous to humans if left undisturbed. However, most soils and dusts are subject to disturbance, either now or in the future, by many different types of activities that are common for residents or workers. The presence of LA contaminated exterior soils and interior dusts poses an exposure hazard for individuals who may frequent and disturb such materials on a routine basis. Asbestos contaminated source materials, such as surface soils, may also serve as an ongoing reservoir for fiber emission and contamination into co-located indoor environments or vehicles, through air currents or transport via human activity (i.e., soil adherence to shoes). Once contaminated, such areas or vehicles can then in-turn serve as secondary sources of ongoing human exposure.

Ongoing EPA investigations at the Libby site have demonstrated that mechanical disturbance of asbestos-contaminated soil or dust by activities similar to those that are likely to be performed by area residents or workers results in elevated levels of respirable asbestos fibers in air. EPA Region 8 evaluated several scenarios involving disturbance of contaminated soils and dusts such as vehicular traffic on Rainy Creek Road, active cleaning of households, sweeping of dust, and rototilling of soil. These scenarios clearly demonstrated that asbestos fibers may be released into the personal breathing zones by a variety of common activities and that a complete pathway exists by which asbestos-contaminated source materials may cause inhalation exposure of area residents and workers. Additionally, EPA found that the concentrations of fibers in air generated by disturbance of source materials may exceed OSHA standards for acceptable occupational exposure, as well as, exceeding EPA's typical excess cancer risk range (1E-04 to 1E-06) by an order of magnitude or more. (Weis, 2001a; Weis, 2001b).

In addition to the Libby site, investigations by Region 8 researchers found that surface soils containing concentrations <1 % of LA by polarized light microscopy (PLM) when disturbed by raking and mechanical blowing scenarios, resulted in airborne asbestos exposures easily approaching, and in one sample exceeding the OSHA PEL (Miller, 2004). These findings are consistent with the results of EPA investigations at other sites, as well as, evaluations performed by other government agencies and researchers. For example, disturbance scenarios simulating baseball, basketball, soccer, bike riding, running, playing on a children's playground, and gardening in low concentration asbestos contaminated soils (<1%) in El Dorado Hills, California, found complete exposure pathways and significantly elevated airborne exposures (EPA Region 9, 2005). Published research performed by Addison et. al. (Addison, 1988) showed that soils containing asbestos concentrations ranging from 1.0 to 0.001% can generate elevated airborne concentrations when disturbed under controlled conditions. Currently EPA has not established an asbestos level in soil or dust below which an exposure does not pose a risk, under any of its regulatory programs. The 1% asbestos concentration levels commonly cited and used for regulatory purposes under the EPA Toxic Substances Control Act (TSCA) abatement program, was established on the basis of analytical capability at the time and does not have any relationship to the actual health risks associated with the handling or disturbance of the contaminated material in question (EPA, 2004). Based on increased recognition of this issue and

advancement of the science, California EPA is currently in the process of adopting new guidance for asbestos contaminated soils at schools which suggests that soils containing asbestos concentrations less than 1% asbestos by weight may need to be remediated, especially in high use areas such as playing fields and dirt roads (Cal/EPA, 2004).

**2. Libby Vermiculite Products**

Disturbance of vermiculite products (e.g., vermiculite insulation, vermiculite garden products) originating from the Libby mine can result in elevated levels of respirable asbestos fibers in the air. Activities similar to those likely to be performed by homeowners and workers that disturb vermiculite products containing even trace amounts or non-detectable concentrations of asbestos by PLM methods, have been demonstrated to release airborne concentrations of fibers which can exceed OSHA and EPA guidelines (Weis 2001b; Versar, 2002; EPA Region 10, 2000). Recognition of this finding has resulted in national warnings by EPA, ATSDR, and NIOSH concerning the dangerous nature of vermiculite insulation used in residences and businesses throughout the United States (EPA & ATSDR, 2003; NIOSH Fact Sheet 2003).

## V. CONCLUSIONS

The rationale for determination of imminent and substantial endangerment from asbestos-contaminated source materials in residential areas of Libby is four-fold:

1) Asbestos 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;

2) Asbestos fibers can be detected in several types of source materials (yard soil, garden soil, driveway material, waste piles, indoor dust, vermiculite insulation) at multiple locations in and around the residential and commercial areas of Libby. These contaminated materials constitute a potential source of asbestos exposure to workers and area residents;

3) Asbestos fibers in contaminated source materials may be released into air by a variety of activities similar to those that area residents or workers may engage in under normal living conditions. This demonstrates that a complete exposure pathway exists by which asbestos-contaminated source materials may result in airborne exposures of area residents or workers;

4) The concentrations of asbestos fibers that occur in air following mechanical

disturbance of source materials may reach levels of potential human health concern, as evidenced by airborne concentrations which can exceed OSHA occupational standards and EPA cancer risk guidelines. Furthermore, given the mineralogic and morphologic characteristics of Libby Amphibole fiber it is likely that the EPA cancer risk guidance may underestimate actual cancer risks for this population.

Asbestos contamination exists in a number of potential source materials at multiple locations in and around the residential and commercial areas of Libby. These potential source materials include area soils (yards, gardens, playgrounds, etc.), driveway material, waste piles, indoor dust, and vermiculite insulation. If these contaminated sources are disturbed by human activities, fibers are likely to be released to air. Chronic, and even higher dose short-term, exposures to airborne LA fibers pose an increased risk for asbestos-related lung diseases. Sampling events involving contaminated source materials at the Libby site, and even at offsite vermiculite processing facilities, consistently indicate the presence of amphibole asbestos which can result in airborne exposures of concern. The concentration levels released to air depend on the concentration of fibers in the source material and on the nature of the disturbance. Risks are proportional to the concentration of fibers in air and the frequency and duration of exposure. While data are not yet sufficient to perform reliable human-health risk evaluations for all sources and all types of disturbance, it is apparent that releases of fiber concentrations higher than OSHA standards may occur in some cases (mainly those associated with active disturbance of vermiculite), and that screening-level estimates of lifetime excess cancer risk can exceed the risk range of 1E-04 usually used by EPA for residents and workers that are unaware of the exposure. In addition to the excess cancer risks, the extremely high prevalence of asbestos-related pleural disease among Libby residents is of great public health concern and is not addressed by the currently available EPA risk guidelines. The occurrence of such high levels of non-occupational asbestos-related disease among Libby residents is extremely unusual, suggesting that a combination of factors likely related to elevated levels and duration of environmental exposures through multiple exposure pathways, and perhaps an increased inherent toxicity of this form of amphibole asbestos, may be involved. On this basis, I recommend that steps be taken to further identify, quantify, minimize and/or eliminate pathways of human exposure to amphibole asbestos in the residential and commercial areas of Libby.

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- Grace's brief - the weak points
- Intermediate steps -
  what we did in the interim (education)

- Impacted population
- ATSDR
- Endangerment memo
- # of homes
- continued exposure
-

crystalize these points

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/Region08

LIBBY #3

Ref: 8EPR-SR

**ACTION MEMORANDUM AMENDMENT**

**SUBJECT:** Action Memorandum Amendment for the Time-Critical Removal Action at the Libby Asbestos Site – Libby, Lincoln County, Montana.

**FROM:** Robert E. Roberts
Regional Administrator

**TO:** Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

New AA

**THROUGH:** Michael B. Cook, Director
Office of Emergency and Remedial Response

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

DRAFT

## I. INTRODUCTION

The purpose of this Action Memorandum Amendment is to: (1) request and document Headquarters approval of a ceiling increase for the Libby Asbestos Site (Site) in Lincoln County, Montana, (2) request and document a continued emergency exemption from the $2 million and one year limits on removal actions as described in National Contingency Plan (NCP) Section 300.415(b)(2), and (3) request and document a consistency exemption from the $2 million and one year limits on removal actions as described in National Contingency Plan (NCP) Section 300.415(b)(2). The previous Action Memorandum Amendment dated May 8, 2002 set forth the need and scope for additional cleanup activities at the Site. Those cleanup activities are progressing and are still considered to be of an emergency nature. However, the difficulty and expense of cleanup is greater than anticipated and an additional removal ceiling is required to continue the necessary emergency response, time-critical removal actions. EPA Region 8 (Region 8) is also concurrently completing a remedial investigation and working toward publication of a Record of Decision (ROD) that will cover needed, but non-time critical response actions.

## II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The initial Action Memorandum and subsequent Amendments provide basic descriptions of the vermiculite mine, vermiculite processing facilities, several contaminated properties, and the conditions found throughout the Libby Valley. Since the date of the previous Action Memorandum Amendment of May 8, 2002, the Site became final on the National Priorities List (NPL) in October 2002. Additional investigation has focused on two major aspects: (1) evaluating conditions at individual residential and commercial properties throughout Libby as necessary to implement the time critical removal actions set forth in the May 2002 Action Memorandum Amendment, and (2) collecting data necessary to complete a Remedial Investigation/Feasibility Study (RI/FS) and publish a ROD. While the total number of properties requiring remediation will remain uncertain until a ROD is published, Region 8 currently estimates that approximately 1400 residential/commercial properties will require response. This is significantly higher than estimates presented in the May 2002 Action Memorandum Amendment. Approximately 550 properties were completed through October 2005.

The Libby Asbestos Site is currently made up of eight operable units (OUs). OU00 and OU4 represent site-wide operable units for removal actions and remedial actions, respectively. OUs 1,2,3,5 and 6 are described in the next section. OU7 represents Troy, MT. Troy is located near Libby and due to its history and location, is suspected of containing similar contamination to Libby. There are approximately 1000 properties in the Troy area. The Montana Department of Environmental Quality (MDEQ) and EPA signed a cooperative agreement which calls for MDEQ to begin investigations and screening of individual properties in 2006. Background work is currently being conducted. Troy is not addressed in this Action Memorandum Amendment.

B. Other Actions to Date

The previous Action Memorandum Amendment provided a description of various activities at the Site and their progress as of May 2002. These activities were completed or continued as necessary and additional activities were started. For activities or locations that were NOT completed as of May 2002, an updated summary is found below:

| PREVIOUS ACTIONS | |
|---|---|
| **Location** | **Action Description and Updated Status** |
| Export Plant | The Export Plant is Operable Unit 1. Pursuant to a Unilateral Order from EPA, W.R. Grace demolished and disposed of four buildings on the property and removed approximately 17,500 cubic yards of contaminated soil and debris from the property. Region 8 completed remaining demolition work at the property of one building in 2002. The lumber business formerly operating at this location was relocated by W.R. Grace in 2003 to a new location in Libby. Removal work here is complete. |

| | |
|---|---|
| Screening Plant | This property consists of five distinct, contiguous parcels and makes up Operable Unit 2. All currently planned removal actions were completed in by 2005. **(1) Raintree Nursery.** Region 8 completed cleanup of this parcel in 2003. Approximately 17 acres were addressed and 250,000 cubic yards of contaminated debris and soil were removed. Restoration of this parcel is essentially complete, with only punch-list items. **(2) North Side Parker Property.** Region 8 completed cleanup here in 2004, addressing approximately four additional acres. **(3) Flyway Property**. Region 8 completed approximately ¼ 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 50,000 cubic yards of soil were removed. EPA, working the Montana Department of Transportation, capped a contaminated area Highway 37 right of way along the Flyway in 2005. **(4) KDC Bluffs Property**. Several areas of the KDC Bluffs parcel were cleaned up by EPA in 2001; some lower level contamination remains which will be evaluated for future Remedial Actions. **(5) Wise Property.** A small property between Raintree Nursery and the Flyway. Cleanup was completed in 2005. |
| Rainy Creek Road | Rainy Creek Road and the mine itself make up Operable Unit 3. Rainy Creek Road is a forest service access road to the former vermiculite mine. It is highly contaminated and site access remains restricted. Nearly half the road was paved and semi-permanent decontamination stations were installed to facilitate soil disposal at the former mine. Soil disposal is ongoing. Operable Unit 3 is targeted for a future Remedial Investigation/Feasibility Study (RI/FS). EPA intends to begin negotiations with W.R. Grace in 2005 regarding future conduct of the RI/FS. The RI/FS will help determine the need for future remedial actions. |
| Libby High School and Middle School Tracks | Cleanup completed by 2002. Both tracks were restored in 2003. Work is complete. |
| Siefke Property | Highly contaminated, large residential property which was identified early. Cleanup was completed in 2002 and restoration was completed in 2004. |
| Johnson, Sanderson, Temple, Struck, Rice, Fuhlendorf, Spencer, and Westfall properties. | Highly contaminated residential properties which were identified early. All cleanup and restoration was completed by 2003. |
| Champion Haul Road | Cleanup was completed in 2003. |
| **NEW ACTIONS** | |

| Location | Action Description and Updated Status |
|---|---|
| Riverside Park and Boat Ramp | Subsurface contamination was encountered during construction of a new park and boat ramp by the City of Libby in 2003. The parcel is contiguous to the former screening plant. EPA halted construction and cleaned the parcel in late 2003. Approximately 15 acres of soil were excavated to an average depth of two feet. Cleanup and restoration is complete. |
| Lincoln County Landfill Asbestos Cell | Region 8 constructed and operates a new cell at the Lincoln County Landfill that is used for disposal of vermiculite insulation and other construction debris. Construction of the cell was completed in 2003. The cell was expanded in 2004. Disposal operations are ongoing. |
| Burlington Northern Santa Fe Rail Yard | The Burlington Northern Rail Yard is Operable Unit 6. Pursuant to an Administrative Order on Consent with EPA, BNSF began cleanup of the contaminated rail yard in 2003 but had to cease work due to complexities with soil removal below the tracks. Work began again in 2004, most tracks were removed, and removal work is now complete. Most contaminated soils were removed, but some contamination was capped in place. Institutional controls for contamination that was left in place will be evaluated as part of the RI/FS and future ROD. |
| Former Stimson Lumber Mill | The former Stimson Lumber Mill represents Operable Unit 5. Region 8 conducted extensive sampling of the former lumber mill and has identified two primary areas requiring cleanup. The first of these, the former central maintenance building, is scheduled to be cleaned up in 2005. The second, a former nursery area, was fenced off in 2004 and is to be further investigated in 2005. |
| Systematic screening and cleanup of individual residential and commercial properties in Libby Valley | As the first phase of the Remedial Investigation (RI), and to gather the information required to make decisions on which properties require time critical removal action, Region 8 inspected and sampled approximately 3700 properties in 2002, 2003, and 2004. Most inspection is complete, though additional RI sampling is planned for 2005. As of October 2005, approximately 550 emergency properties have been cleaned up, including several properties that were recently identified. Work is ongoing. |

C. Current Actions

Region 8 is continuing systematic investigation and cleanup of individual properties throughout the Libby area described in the May 2002 Action Memorandum Amendment. There are multiple objectives to the investigation: (1) identify properties that meet criteria for time critical removal actions and require immediate cleanup, (2) collect information and data necessary to complete an RI/FS, Baseline Risk Assessment, and ROD, and (3) identify properties that may require future Remedial Action based upon criteria that will be set forth in the ROD.

Based on current knowledge, Region 8 *estimates* that at least 1400 residential/commercial

properties will require cleanup, of which approximately 850 remain (approximately 550 time critical removal action properties were cleaned up through October 2005). The 1400+ figure includes properties that meet criteria for time critical removal actions as well as estimates of the number of properties that may meet future criteria established for remedial action. While a large percentage of properties remaining to be cleaned up have conditions justifying time critical removal actions, cleanup of these properties using removal authority will generally continue only until publication of ROD, at which time cleanup will continue using remedial authority. Remedial authority will then be used to clean up both properties that meet time critical removal action criteria but are not yet complete, and properties that may meet future criteria established for remedial action. (Note that EPA may encounter situations in the future for which removal actions are appropriate, even after a ROD is published). EPA will continue to prioritize properties that meet time critical removal action criteria and conduct cleanup as rapidly as resources and conditions permit. Region 8 expects to publish a ROD for residential/commercial cleanup (Operable Units 00 and 04) in 2006. The ROD will establish final cleanup levels and criteria which will enable Region 8 to more accurately quantify the total number of properties requiring cleanup.

In addition to conducting physical cleanups, EPA also continues to provide guidance, training, and assistance for Libby residents. Such actions include development and publication fact sheets for residents and local contractors that may encounter vermiculite and asbestos, 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 that cannot be immediately addressed through removal actions.

Region 8 has made significant progress toward a ROD despite both limited funding and the extremely complex nature of asbestos analysis and risk assessment. A few critical activities are highlighted below:

- In 2002, 2003, and 2004, Region 8 inspected and sampled approximately 3700 properties in the Libby area. EPA inspected for vermiculite insulation, visible vermiculite in soils, and collected soil and dust samples. Because contamination was generally placed at particular properties through human activities, rather than being spread uniformly by air or water, there was no clear pattern to the contamination. This warranted that each property in Libby be inspected. The information collected was used to determine which properties warranted time critical removal actions and for defining the nature and extent of contamination across the Site.
- In 2002 and 2003, Region 8 designed and began conducting a Performance Evaluation (PE) Study to test the efficacy of existing and new analytical procedures for measuring asbestos in soil. Existing analytical methods are often not cost effective and are often unable to detect asbestos in soil at levels that are of likely health concern. The PE Study was extremely complex, primarily because some methods had to be modified and developed specifically for Libby and there were no existing "standards" to test the methods against. Most of the PE Study is complete. The study helped Region 8 develop and validate a cost-effective, new analytical

method tailored to Libby soils. This method was used to analyze over 15,000 soil samples collected in residential yards.

- In 2003, Region 8 published the Draft Final Action Level and Clearance Criteria Technical Memorandum, which set forth additional screening level risk assessment calculations for Libby and the criteria for determining if a property warrants a time critical removal action under the current emergency response program (EPA Region 8, 2003).
- In 2002, 2003, and 2004 Region 8 has worked extensively with EPA Headquarters and other EPA Regions in reviewing and updating the IRIS asbestos risk model. Developing and adopting a more accurate and accepted risk model is necessary for completion of a credible Baseline Risk Assessment in Libby.
- In 2004, Region 8 designed and conducted a post-cleanup sampling program to test the efficacy of the residential/commercial cleanup approach. This data is critical for evaluation of interim containment measures included in the removal action cleanup plan (such as leaving contamination in place in walls, or leaving contamination at depth) and for development of final cleanup levels and protocol (CDM, 2003c, 2004).
- Region 8 is currently conducting RI sampling to fill in remaining data gaps, focusing on evaluation of current cleanup protocols and low concentration exposures that will likely be the subject of future Remedial Actions.

D. State, Local, and Other Authorities Roles

There are no significant changes in roles from the May 8, 2002 Action Memorandum Amendment, other than the Montana Department of Environmental Quality assuming the lead role for the investigation and screening of Troy, MT.

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

**A. Despite significant progress on cleanup, conditions in Libby still present significant threats to public health. EPA has considered the factors the determine the appropriateness of a removal action described in Section 300.415(b)(2) of the NCP and at least two factors continue to be present in the Libby area:**

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

- Libby asbestos contaminated source materials (e.g., indoor dust, yard and garden soils, driveway materials, vermiculite insulation) are still found throughout the community. The Action Memorandum Amendment dated May 8, 2002 described these conditions in detail (EPA Region 8, 2002). Subsequent investigations have shown that about one-third of the approximately 4000 properties in the Libby area contain varying levels of contaminated source materials, such as vermiculite insulation or contaminated soils

(CDM, 2002 and 2003a)

- Investigations have clearly shown elevated levels of Libby asbestos in the dust of resident's homes. (CDM, 2002, 2003a and 2003b; EPA Region 8, 2003) This dust contamination comes from several sources including but not necessarily limited to: contaminated soil at the property that is tracked into the home; contamination that was picked up at former vermiculite processing facilities in the past and brought home on clothes and equipment; releases of vermiculite insulation from the attic or walls.

- These asbestos contaminated source materials, when disturbed, may release asbestos fibers to the 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. Activities similar to those that are likely to be performed by area residents and workers can result in elevated concentrations of respirable asbestos fibers in air. Further, concentrations of fibers in air generated by disturbance of contaminated source materials may exceed OSHA occupational standards and EPA cancer risk guidelines (EPA Region 8, 2003; Weis, 2001; Miller, 2005).

- Asbestos 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; Miller, 2005).

**(iv). 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 Libby asbestos 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 interior of homes with asbestos-containing dust. Screening level risk calculations by Region 8 suggest that the contamination of indoor dust by outdoor soils is one of the most important exposure pathways in Libby (EPA Region 8, 2003).

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 has discovered several new "public" areas of contamination in Libby as well.

These include J. Neils Park, the public golf course, the St. John's Hospital helipad, the right-of-way (ROW) along Highway 37, the public compost pile at the county landfill, and others. Some of these properties present 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 public Golf Course, EPA has instituted interim containment measures such as fencing and/or issued public warnings. These properties and others were earmarked for possible future remedial action.

## IV. ENDANGERMENT DETERMINATION

The actual or threatened releases from this Site, if not addressed by continuing to implement the time critical removal actions set forth the in the original Action Memorandum and subsequent Amendments, may present an imminent and substantial endangerment to public health, 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 the toxicity associated with Libby asbestos, the significantly elevated disease rate in Libby residents, and the variety of conditions present in and around Libby that lead to continuing exposures.

## V. EXEMPTION FROM STATUTORY LIMITS

The original Libby Action Memorandum dated May 23, 2000 provided the documentation required to meet the NCP Section 300.415(b)(2) criteria for a removal action and the NCP Section 300.415(b)(5)(i) emergency exemption from the $2 million and one year limits on removal actions. The most recent Action Memorandum Amendment dated May 2002 expanded the scope of removal actions and raised the approved removal ceiling to $55,635,000. The conditions necessitating removal actions still exist. The difficulty and costs of mitigating these conditions have proven higher than originally estimated. Region 8 is formally requesting an additional increase to the removal ceiling in order to continue and complete work approved in the May 2002 Amendment.

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 current exposures and the observed high rate of disease, these risks are of an immediate and emergency nature. While conditions have improved considerably through EPA intervention, hundreds of properties meeting criteria set forth by EPA Region 8 for time critical removal actions have yet to be addressed. Exposures to an already impacted population continue to 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 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:

- Libby Asbestos, the contaminant of concern in Libby, is a naturally occurring 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 both 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 the source.
- Investigations have shown that sources of Libby asbestos, including, but not limited to, contaminated soil, vermiculite insulation, and vermiculite processing wastes are prevalent throughout Libby. Past investigations have clearly shown that, when disturbed, these sources can release asbestos to the air and have the potential to contaminate indoor dust. The primary objective of the removal actions in Libby is to remove or isolate these sources. Any future remedial actions are likely to employ source removal as a key component of cleanup.
- To EPA's knowledge, large-scale removal of vermiculite insulation had not been attempted prior to EPA's cleanup in Libby. Due to the highly friable and pervasive nature of this material, it presented numerous technical challenges. Various cleanup techniques for dealing with vermiculite insulation and other media were evaluated during the initial cleanups of residential/commercial properties. Region 8 used this experience to evaluate the efficacy of various approaches and to refine our cleanup strategy. This information will be used in the RI/FS.
- While the *basic* approach to asbestos cleanup is well understood and relatively simple, the degree to which cleanup is necessary, and exactly which situations require cleanup, is *not* well understood or simple. A large degree of uncertainty exists in the scientific community as to (1) what constitutes a "safe" level of asbestos in soil, dust, and other media and (2) how to effectively measure these levels. This makes establishment of site-specific action levels extremely challenging. As described in Section II (C) of this Amendment, EPA is currently working to resolve these difficult issues and continues to evaluate the effectiveness of interim containment measures instituted as part of removal actions. However, to ensure that Removal Actions are protective and consistent with future remedial actions at Libby, Region 8 has taken a conservative approach and adopted protocols that attempt to minimize the possibility of having to clean up a property twice. In general, EPA only begins a cleanup if a property has conditions that warrant a time critical removal action, but once a cleanup begins, EPA addresses lower levels of contamination. Post-cleanup sampling has thus far validated the efficacy and protectiveness of the cleanups (CDM, 2003c, 2004). This approach ensures the worst risks are addressed first and is cost-effective, protective, and well accepted by the community and the State of Montana. The RI/FS will evaluate current cleanup protocols as well as other options for cleanup.

## VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Action Description

The Action Memorandum Amendment dated May 2002 set forth the proposed actions. While the basic need for cleanup and 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.

B. Contribution to remedial performance

The Site was made final on the NPL 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 is used to continually refine the process 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 are made as necessary. The most contaminated properties are targeted first, and as discussed in Section V of this Amendment, by taking steps such as removing all *detectable* asbestos from surface soils, EPA attempts to ensure that properties must only be cleaned once. This approach is protective as well as cost effective. 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, but there are no known viable alternative technologies available at this time for addressing asbestos.

D. EE/CA

No EE/CA is required.

E. Applicable or relevant and appropriate requirements

See the Federal and State ARARs identified and/or discussed in the original Action Memorandum dated May 23, 2000.

F. Project Schedule

The total number of properties requiring clean up will not be known until publication of a ROD, expected in 2006. Based on current knowledge, Region 8 estimates that approximately 1400 properties will require cleanup, of which approximately 550 have already been addressed. While a large percentage of remaining properties have conditions described in the May 2002 Action Memo Amendment, cleanup using removal authority will continue only until publication of a ROD, at which time cleanup will continue using remedial authority. Remedial authority

will then be used to clean up both classifications of properties: those that meet time critical removal action and emergency criteria but are not yet complete, and those that may meet future criteria established for remedial action. (Note that EPA may encounter situations in the future for which removal actions are appropriate, even after a ROD is published. EPA will also continue to prioritize cleanup of properties that meet time critical removal action criteria). Region 8 expects that approximately 170-200 properties can be cleaned up per year at current funding levels. The overall project schedule is contingent upon funding and the total number of properties requiring cleanup, but based on current knowledge, the current funding situation, and the actual date of a ROD, Region 8 estimates that approximately 1-2 years of time critical removal actions and 4-6 years of remedial actions remain. Approximately 200 properties are expected to be completed in calendar year 2005.

G. Estimated Costs

The ceiling increase is projected to cover two years of additional removal actions at production rates similar to those in 2003-2005 (170-200 properties expected to be cleaned per year). 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 vermiculite insulation. Because of this, Region 8 has expended funds quicker than anticipated and the job is not complete. However, after two years of investigation and cleanup, Region 8 is able to more accurately forecast cleanup requirements, both on a per property basis and overall. Because of this increased accuracy, and for simplicity, this Amendment provides only a basic, cumulative breakout of existing and proposed removal ceilings (Table 1), as well as a summary of other external costs that have been incurred that do not count against the removal ceiling (Table 2).

DRAFT

note the costs that are not included & give examples of what these costs are

Table 1. Proposed Site Ceiling

| Category | Approved Ceiling (Action Memo Amendment dated May 2, 2002) | Proposed Ceiling Increase | Proposed Total |
|---|---|---|---|
| Extramural Costs | $45,525,000 | $30,000,000 | $75,525,000 |
| Contingency @ 20% of Extramural | $9,100,000 | $6,000,000 | $15,100,000 |
| Intramural Costs | $960,000 | $100,000 | $1,060,000 |
| **TOTAL** | **$55,635,000** | **$36,100,000** | **$91,735,000** |

Table 2. Other major expenditures not counted against ceiling. Note that amounts are approximate. Also note indirect costs & potential enforcement & litigative costs are not included in this table and not required to be counted against the ceiling

| Task | Previous Expenditures Through CY 2004 (approximate) | Planned Expenditures CY 2005-2006 (approximate) |
|---|---|---|
| Phase I and Phase II Removal Sampling Investigations | $8,100,000 | 0 |
| Medical Screening Support | $500,000 | 0 |
| Contaminant Screening Study (first phase of Remedial Investigation) | $5,000,000 | $500,000 |
| Remedial Investigation & Risk Assessment | $2,500,000 | $1,500,000 |
| Performance Evaluation/ Analytical Methods Study | $1,000,000 | $200,000 |
| USGS Support | $2,000,000 | 0 |
| Community Involvement | $500,000 | $500,000 |
| Database Creation, Management, Quality Assurance, and Data Entry | $2,000,000 | $1,500,000 |
| **TOTAL** | **$21,600,000.00** | **$4,200,000.00** |



Direct & Indirect

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

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

## VIII. OUTSTANDING POLICY ISSUES

There are no new policy issues or considerations.

## IX. ENFORCEMENT

The confidential summary of Enforcement Actions is attached to the original Action Memorandum and Amendments.

## X. RECOMMENDATION

This decision document represents the selected removal action for the removal of Libby asbestos sources from targeted homes, businesses, and public buildings 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 meet the NCP [40 CFR § 300.415(b)] criteria for a removal action, and the NCP [40 CFR § 300.415(b)(5)(i)] and [40 CFR § 300.415(b)(5)(ii)] criteria for exemptions from the statutory limits. I recommend your formal approval of the proposed removal action ceiling increase.

Approve: _____ Date: _____
Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

Disapprove: _____ Date: _____
Thomas P. Dunne
Acting Assistant Administrator
Office of Solid Waste and Emergency Response

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