AMENDMENT A
LIBBY ASBESTOS SITE
RESIDENTIAL/COMMERICAL CLEANUP
ACTION LEVEL AND CLEARANCE CRITERIA
TECHNICAL MEMORANDUM

I. INTRODUCTION

As part of the response actions on the Libby Asbestos Project, the United States Environmental Protection Agency (EPA) developed project-specific action level and clearance criteria for the removal of Libby Amphibole (LA) asbestos at residential and commercial properties. The *Draft Final Libby Asbestos Site, Residential/Commercial Cleanup Action Level and Clearance Criteria Technical Memorandum* (Tech Memo) (EPA 2003) was developed with preliminary data collected during the 2002 remedial investigation (RI), known as the Contaminant Screening Study (CSS) (CDM 2003a). The Tech Memo provides specific details about action levels that are used for selecting properties for response actions and evaluation criteria used to determine if the response actions were successful. The document also contains screening-level risk calculations that EPA developed to establish relationships between LA levels in site media and the associated health risk to residents. The Tech Memo has been used since its publication for developing project guidance documents for site investigations (e.g., General Property Investigation [GPI] sampling and analysis plan [SAP]), response action clearance criteria (e.g., response action work plan [RAWP] and associated SAPs), and response action property selection. While final site-specific cleanup standards will be established upon completion of the remedial investigation/feasibility study (RI/FS) and publication of a record of decision (ROD), the Tech Memo and this amendment will continue to serve as guidance for project-specific decision making, action levels, and clearance criteria.

Since publication of the Tech Memo in December 2003, modifications have been made to investigation and sampling techniques and removal decision criteria. These updates were generally implemented based on updated analytical data, increased investigation experience, and enhanced approaches to construction. These changes have streamlined and improved the efficiency of the investigations and removal processes while allowing the EPA to achieve the response action goals set forth in the Tech Memo.

The purpose of this amendment is to summarize the changes to the Tech Memo. This amendment does not include any discussion or updates to health risk evaluations to residents. It should be noted that several guidance documents described in the original Tech Memo have been replaced and/or revised by more recent versions.

The following table outlines the changes made to project protocols since the publication of the 2003 Tech Memo. . Further discussion of these changes is included in subsequent sections.

Protocol Change	Date of Implementation
Added Removal of Non-Specific Use Areas that Contain Vermiculite	January 2007
Halted the Collection of Dust Samples	July 2007
Modified Use Area Removal Criteria	July 2010
Enhanced Cleanup Strategy	March 2011
Added Consideration of Understructures	June 2011

II. REMOVAL OF NON-SPECIFIC USE AREAS (NSUAs) THAT CONTAIN VERMICULITE

At the beginning of 2007, NSUA's were segregated into three categories to define when a removal would be conducted. The categories were defined as: common use areas (yards not designated as a specific use area), limited use areas (fields, pastures…), and non-use areas (wooded or natural areas). The modification of the use areas is further described in section V of this amendment. In 2007, the cleanup approach was modified to allow for the removal of vermiculite-containing soils from common use areas and limited use areas. Cleanups did not extend to non-use areas unless a significant source of LA was identified.

In the original tech memo, the EPA initially established two primary action levels for the removal of outdoor contaminated soil: 1) any level of visible vermiculite and 2) LA concentrations at levels greater than or equal to 1 percent (%) based on polarized light microscopy (PLM) analysis. These criteria were used as triggers for initial removal actions at residential properties, the former export plant, the former screening plant and flyway property, and Libby schools. The RI/FS for Libby residential and commercial properties began in 2002 while removal actions at contaminated properties continued. The CSS, the first phase of the remedial investigation (RI), was designed to inspect properties for visible vermiculite in soil and collect soil samples only in areas where vermiculite was not observed (CDM 2002). Results of the 2002 CSS field effort revealed a higher than anticipated number of properties with vermiculite-containing soil, ranging from discrete flakes to areas with high levels of vermiculite. Due to these findings, EPA re-evaluated the removal action triggers and decided to limit the removal of vermiculite-containing soil to specific-use areas (SUAs). As a result, some properties that had removals in 2003 had vermiculite-containing soil left in place in NSUAs. Because soil samples were not collected from these NSUAs in the 2002 CSS, for the 2003 CSS field effort, properties where vermiculite was observed in NSUAs during the 2002 CSS were re-visited and vermiculite-containing NSUAs were sampled (CDM 2003). If measured LA soil concentrations were greater than or equal to 1% based on PLM, a removal of the NSUA was completed. However, NSUAs with LA soil concentrations less than 1% were left in place. Additional detail on this decision is described in the original Tech Memo.

As part of the ongoing evaluation of project analytical methods and cleanup criteria, the EPA re-evaluated the correspondence between the presence of visible vermiculite and detectable levels

of LA in soil samples analyzed by PLM. Initial studies showed that 74% (N=567) of soil samples collected from areas with visible vermiculite had detectable (trace or higher) levels of LA by PLM 9002 (National Institute for Occupational Safety and Health [NIOSH] 1994) (EPA 2002). In 2003, the EPA modified the PLM method for soil samples and began analyzing soil samples by a project-specific polarized light microscopy visual estimation (PLM-VE) method, which utilizes LA-specific reference materials (EPA 2004). In 2006, the EPA performed a pilot study to evaluate the correlation of LA results by PLM-VE to soil samples with visible vermiculite levels reported as trace, moderate, and gross. Results of this study suggested that the visual presence of vermiculite in a soil sample is a useful indicator of LA in soil, with the probability of LA being detected increasing in proportion to the level of visible vermiculite present (SRC, 2006). As a result, field inspection techniques for identifying vermiculite in surface soils were refined. A Project-specific standard operating procedure (SOP) CDM-LIBBY-06, *Site-Specific SOP for Semi-Quantitative Visual Estimation of Vermiculite in Soils at Residential and Commercial Properties* (CDM 2007b) was developed in October 2006 and revised in May 2007 to standardize a protocol for performing visible vermiculite inspections in surface soils.

III. HALTED THE COLLECTION OF DUST SAMPLES

Dust samples were collected as part of the interior inspection. As part of its ongoing evaluation of project data collection procedures, the EPA initiated a dust pilot study in 2007 to investigate the usefulness and reproducibility of dust sample results collected in operable unit (OU) 4 (CDM 2007a). Of the 160 dust samples collected as part of the study, 154 were analyzed. The low LA concentrations observed in the analytical results and the inability to collect samples with reproducible data resulted in the EPA eliminating the collection of dust samples for property investigations in July 2007 (CDM 2010a). The action level criteria for dust as discussed in the original Tech Memo are not changed. Also, the EPA decided if dust samples results were available, they would be used in preparing a property cleanup design. In some cases, dust samples had been collected prior to July 2007 and not analyzed. If a property had been selected for a response action and archived dust samples were available, the dust samples would be retrieved, analyzed, and the results used to prepare the property cleanup design.

IV. MODIFIED USE AREA REMOVAL CRITERIA

Residential properties in Libby selected for response action are prioritized using a number of factors. Properties having elevated levels of LA in outdoor soils or indoor dust, or properties where significant quantities of vermiculite are leaking into living spaces are generally selected first, as a "worst-first" approach. While most of these properties have been identified and addressed to date, new properties that fit these criteria may be identified as general property inspections (GPIs) continue (CDM 2010b). In addition to the worst-first approach, properties are selected geographically within neighborhoods to the extent possible to maximize efficiency during investigations and response actions.

As the project has progressed, properties in town were typically selected first followed by satellite neighborhoods further from the city center. In these more rural areas, property sizes and land use areas tend to be larger than those in the city. For larger properties, use area designation is critical in determining investigation and response action protocol as not all use areas are used or maintained the same way. Therefore, the following land use designations were established for determining inspection and soil sampling protocol:

- Specific-use area (SUA): flowerbeds, gardens, flowerpots, stockpiles, play areas, dog pens, non-paved driveways, parking lots, roads, and alleys
- Common-use area (CUA): yards, walkways, and former gardens and flowerbeds
- Limited-use area (LUA): pastures, maintained/mowed fields, overgrown areas with trails/footpaths, and overgrown areas between SUAs/CUAs
- Non-use area (NUA): wooded lots and unmaintained fields
- Interior surface areas (ISA): soil floor of garages, pump houses, sheds, crawlspaces, and earthen basements

The above land use designations are described in greater detail in the General Property Investigation work plan (CDM 2010b).

As more rural properties were selected for response action based on primary triggers present in interiors, SUAs, and/or CUAs, there was an increase in the number of LUAs included for removal, mostly due to analytical results based on PLM-VE. In addition, although NUAs are not sampled or inspected as part of property investigations, LA source materials (e.g., vermiculite stockpiles) have been observed within NUAs. These occurrences have resulted in the removal of significant quantities of soil from LUAs and NUAs that are infrequently used by property owners, extending cleanup duration and increasing restoration costs. Since health risks associated with exposure to LA in infrequently used or minimally disturbed use areas are not fully understood, the EPA updated the approach for addressing NUAs and LUAs.

As of July 1, 2010, the EPA modified the approach to addressing LUAs and NUAs:

- Sections of LUAs will be removed if soil sample results by PLM-VE are equal to or greater than 1% LA and/or moderate or high quantities of vermiculite are observed as described in CDM-LIBBY-06 (CDM 2007b).
- NUAs are inspected only if there is substantial evidence (e.g., homeowner information) that LA source materials may exist. NUA removals are addressed on a case-by-case basis but are triggered if high amounts of vermiculite, as described in CDM-LIBBY-06 (CDM 2007b), are observed or elevated (i.e., greater than 1%) levels of LA are detected in soil samples.

During GPIs, field teams will assign land use designations and perform inspections in accordance with the GPI SAP (CDM 2010b). This information will be used to develop site-specific response action work plans (PRI 2011).

This approach does not assert that a soil concentration of less than 1% LA is protective of human health. However, this approach provides flexibility to the EPA to direct resources to properties where higher exposure to LA-contaminated use areas is more likely to occur. The EPA plans to perform activity-based sampling (ABS) in LUAs and NUAs in accordance with the *Framework for Investigating Asbestos-Contaminated Superfund Sites* (EPA 2008). In addition, the EPA is continuing investigations and studies to quantify background levels of LA in area soils. Results

of these investigations, as well as improved analytical methods, may result in changes to this approach. The approach to addressing health risks at LUAs and NUA's will be included in the Record of Decision.

V. 2011 ENHANCED CLEANUP STRATEGY

The EPA's cleanup strategy has evolved over the course of the project to ensure compliance with cleanup goals as described in the original Tech Memo while maximizing efficiency and managing costs. Removal investigation efforts include pre-design inspections (PDIs) (CDM 2003b) and GPIs (CDM 2010b), which are designed to determine the nature and extent of LA contamination throughout a property. Data obtained during these investigations are compared to action levels discussed in the original Tech Memo and used to develop site-specific response action work plans, supplements to the RAWP (PRI 2011).

Several improvements have been made to the cleanup approach based on increased experience, constructability considerations, and improved investigation techniques. The EPA documented an enhanced approach to performing response actions at commercial and residential properties in March 2011. The 2011 enhanced cleanup strategy includes guidelines to be used in developing site-specific work plans and subsequent response actions. As individual properties are unique and present specific characteristics, the guidelines are designed to bring consistency in cleanup protocol across all properties.

The 2011 enhanced cleanup strategy guidelines include, but may not be limited to, the following criteria:

- All landscape vegetation (e.g., lilacs, shrubs, tulips, etc.) with contamination in and around the root structure will be removed (i.e., not saved/protected under any circumstance).

- Mature trees located within a contaminated area would not be removed since they could not be moved by the property owner. For non-fruit bearing trees, mature trees are those that have a diameter at breast height (DBH) greater than or equal to 6-inches For fruit bearing trees, mature trees are those that have a DBH greater than or equal to 4-inches. All trees that have a smaller DBH will be removed and replaced.

- If alleys are adjacent to properties identified for response action, they will be inspected during the GPI. A response action will be performed if any removal action trigger is present.

- Discrete, non-contaminated partial yard areas will not be left in place if all adjacent yard areas are being removed. That is, non-contaminated "islands" will be removed.

- If SUAs are being removed, the area immediately outside the perimeter , generally extending to12 inches beyond the perimeter (but may vary depending on specific site conditions) of the SUA will also be removed.

- Field/design judgment will be used to determine if the entire outdoor area of a property should be removed. This applies to cases where only discrete areas or portions of use areas within a property do not require removal. For example, if a driveway is the only

use area not requiring removal at a property, it should be included in the removal area to minimize the chance of leaving contamination.

If non-contaminated areas are identified for removal in accordance with this revised approach, appropriate documentation, and the rationale for this decision will be kept in the property file folder for reference. This cleanup strategy may continue to be modified as the EPA and its contractors continue to improve the overall response action construction process.

VI. ADDRESSING UNDERSTRUCTURES

As a result of property investigation of attic areas and living spaces, the EPA found that exposure in the understructure of buildings needed to be addressed. Understructures include the substructure or foundation of the building and are typically enclosed. Building understructures may be habitable or inhabitable and at least partially below ground surface. While not as frequently accessed as living areas, vermiculite or LA containing soil may be present in building understructures. To address this potential exposure to LA, understructures will be evaluated similar to living spaces if they are entered more than once a month by the property owner. Understructures that are entered less than once a month by property owners will be evaluated by observation only. Furthermore, since these areas have soil floors, it is not possible to collect aggressive air samples. Thus, the EPA will not collect air clearance samples in understructures after a cleanup has been completed. Further detail on the protocol for addressing understructures is described in the Removal Action Work Plan (Project Resources, Incorporated [PRI] 2011).

VII. REFERENCES

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VIII. APROVAL

I approve this amendment to the original Tech Memo.

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