Libby Asbestos Superfund Site
The Former Stimson Lumber Mill,
Operable Unit 5
Lincoln County, Montana

Final Operations and Maintenance Plan, Revision 0

USACE Contract No. W912DQ-15-D-3013

Task Order No.: DK03

EPA RPM: Dania Zinner

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Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
ARP	Asbestos Resource Program
bgs	below ground surface
BMP	best management practice
BOH	City-County Board of Health for Lincoln County
CDM Smith	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cubic yards	yd^3
DEQ	Montana Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
Grace	W.R. Grace & Co. – Conn.
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HI	hazard index
IC	institutional control
ICIAP	Institutional Control Implementation and Assurance Plan
LA	Libby amphibole asbestos
LCPA	Lincoln County Port Authority
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
O&F	operational and functional
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
OU	operable unit
%	percent
RA	remedial action
ROD	Record of Decision
ROW	right-of-way
RPM	remedial project manager
SEMS	Superfund Enterprise Management System
Site	Libby Asbestos Superfund Site
U-Dig	Montana One-call notification center
USACE	U.S. Army Corps of Engineers
VCI	vermiculite-containing insulation
VCS	vermiculite-containing soil

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Section 1
Introduction

This Operations and Maintenance (O&M) Plan presents the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the Operable Unit (OU) 5 remedial action (RA) at the Libby Asbestos Superfund Site (Site) (Superfund Enterprise Management System [SEMS] # MT0009083840) in accordance with guidance developed by the U.S. Environmental Protection Agency (EPA) for *Operation and Maintenance in the Superfund Program* (EPA 2001a). An O&M Plan is required at OU5 of the Site because controls have been employed to address contamination remaining at various levels within the Site. The Site is depicted in Figure 1-1 and the OU5 boundary is depicted in Figure 1-2.

OU5 is the subject of this O&M Plan and includes areas impacted by contamination from activities associated with mining, processing, and shipping of vermiculite by the W.R. Grace & Co. – Conn. (Grace). Exposure to vermiculite and Libby amphibole asbestos (LA) was largely mitigated by removal of surface soil and the placement of clean soil backfill and insulation and/or buildings materials in areas of OU5 (known as the former Stimson Lumber Mill) during removal activities. This O&M Plan was prepared to monitor physical remedies, engineered controls, and non-engineered controls associated with remaining LA and LA source materials present in surface soil, subsurface soil, and within currently inaccessible areas of buildings on the OU5 site. Figures 1-3, 1-4a, and 1-4b show remaining known vermiculite and LA present in both surface and subsurface soil at OU5.

The selected remedy for land uses in OU5 include Alternative SO6: Partial Excavation of Contaminated Soil, Disposal of Excavated Soil at the Former Libby Vermiculite Mine, Administrative Controls, and Monitoring; and Alternative BM5: Partial Removal of Accessible Contaminated Building Materials, Disposal of Removed Materials at an Existing Permitted Facility, Encapsulation of Remaining Contaminated Building Materials, Interior Cleaning, Administrative Controls, and Monitoring. These alternatives are further detailed in the *Record of Decision for Libby Asbestos Superfund Site, Libby and Troy Residential and Commercial Properties, Parks and Schools, Transportation Corridors, Industrial Park, Operable Units 4-8* (ROD) (EPA 2016a).

In general, the remedy for the Site has consisted of a combination of excavation of contaminated soil and replacement with clean backfill, and physical removal of contaminated building materials, with proper disposal of these contaminated media and blocking/sealing of remaining contaminated building materials.

1.1 Site Location and Background

The Site is located in and around the City of Libby, Montana. Libby is the county seat of Lincoln County and is in the northwest corner of Montana, about 35 miles east of Idaho and 65 miles south of Canada.

OU5 is defined geographically by the parcel of land that included the former Stimson Lumber Mill. OU5 is bound by the high bank of Libby Creek to the east, the Burlington Northern Santa Fe railroad to the north, and residential/commercial/industrial property within OU4 to the south and west (Figure 1-2). The OU is approximately 400 acres in size and is currently occupied by various vacant buildings and multiple operating businesses (lumber processing, log storage, excavation contractor, etc.). The Libby Groundwater Superfund Site is co-located within OU5. Remedial and O&M activities associated with the Libby Groundwater Superfund Site are not addressed in this O&M Plan.

The J. Neils Lumber Company began wood treating operations at OU5 in approximately 1946. The lumber company and wood treating operation was purchased by St. Regis Corporation in 1957. Champion International Corporation purchased the facility in 1985, and then sold it to Stimson Lumber Company in 1993. Most of the lumber production activities ceased in 2003 when Stimson Lumber Company sold much of the property to the Lincoln County Port Authority (LCPA). Other property owners within the OU5 boundary include International Paper; Flathead Electric Coop, Inc.; Stinger Welding Montana, Inc.; and the Millpond Motocross Association, Inc. Portions of OU5 are currently being redeveloped for a variety of industrial, commercial, and recreational uses. Figure 1-3 shows former and current land uses, buildings, and additional land ownership throughout the site. One of the largest structures at OU5, the plywood plant, was destroyed by fire in early 2010.

During interviews conducted for OU5 in 2001, three specific outdoor subareas of interest were identified as containing potential vermiculite and associated LA contamination (Figure 1-3):

- The former popping plant was once used as an aboveground storage area for uncontained vermiculite ore. Ore was stockpiled directly on the native soil surface in this area.
- The railroad spur was used for shipping raw and unprocessed vermiculite material to and from OU5.
- The former tree nursery may have introduced raw vermiculite product into this area as a growth medium and fill material.

Additionally, waste bark piles remain from historical lumber processing activities at OU5.

Exposure to contamination has largely been mitigated by the removal of surface soils within OU5. In addition, various response actions involving removal, cleaning, blocking, and sealing of vermiculite-containing insulation (VCI) and LA-containing building materials and debris have occurred at the site. Details of investigation, removal, and response activities within OU5 are detailed below and in the *Final Remedial Investigation Report, Operable Unit 5 – Libby Asbestos National Priorities List Site* (HDR 2013) and the *Final Remedial Action Report, Operable Unit 5 – The Former Stimson Lumber Mill* (CDM Federal Programs Corporation [CDM Smith] 2016).

On August 9, 2017, an OU5 site walkthrough occurred with the EPA, the Montana Department of Environmental Quality (DEQ), agency contractors, and other stakeholders to serve as a final site inspection. The following is a summary of the final site inspection and completed response actions:

- Test plot/demonstration area: The test plot/demonstration area located just west of LCPA's main office is anticipated to be returned to its original appearance (i.e., yard/grass) once RA is complete at the Site. This area is being used for revegetation demonstrations, with plots consisting of the following: Libby lawn seed, playground seed, horse pasture seed mix, native ground covers, Kootenai National Forest seed mix, and Montana wildflower seed mixture. The area was inspected in 2012 and it was noted that vermiculite-containing soil (VCS) was visible at 12 inches below ground surface (bgs) and in the sidewalls of the test plot/demonstration area during the removal action. The sidewalls were covered with a marker barrier as an indication of VCS but did not meet criteria for additional excavation, and as such, the VCS in the sidewalls of the excavation was left in place as part of the removal action. Once the area is returned to its original appearance, further O&M is not anticipated.

- Truck barn: The truck barn building is located directly north of the central maintenance building. In March of 2017, a portion of the truck barn collapsed due to heavy snow loading and rain. LCPA hired a consultant to evaluate the building for asbestos-containing material. Samples were collected for analysis; however, at the time of the final site inspection, analytical results were not yet available.

- Central maintenance building: The central maintenance building consists of several separate rooms with individual access points (doors and garages). Portions of the building are used for commercial business and other portions remain vacant or are used for storage.

  Several removal actions were completed in the central maintenance building, but most were emergency response actions because of repairs or modifications. In 2005, portions of the building roof were replaced. In addition, VCI was removed from interior and exterior walls within the large north bay of the building, and a surface scrape was completed along the footprint of the west side of the building.

  In September of 2009, the northeast wall of the central maintenance building and the surrounding soils were removed. In 2011, debris was removed and disposed of from several areas within the building (identified in site workplans) and the areas cleaned. Spray foam was used between cracks in tongue-and-groove walls.

  In October of 2012 a garage door had been installed in the bolt area (currently F&H Mine Supply area). This installation triggered an emergency response action. As a result, the room was cleaned, sealed and foam was sprayed in the cracks of the tongue-and-groove walls.

  In the garage bay used by Thompson Construction, it was noted that due to roof repair, EPA contractors performed spot and interior cleaning activities in multiple rooms using spray foam and encapsulant prior to conducting air clearance.

- Libby fish pond/recreational area: Investigation and subsequent removal action occurred in 2013 for a proposed fishing pond location due to a surface sample result indicating 1 percent (%) LA in the area. Approximately 960 cubic yards (yd^3) of soil were removed following the investigation for the proposed fishing pond. O&M is not anticipated in this area.

- Former plywood plant: Response actions for contaminated soil and building materials took place following a fire that destroyed the building. The concrete foundation is all that currently remains from the original building. Contaminated soil was removed along the trenched area north of the former veneer dryer in 2010. At that time, vermiculate was visible on the floor of the excavation area. In addition to the excavation area being backfilled with clean materials, the property owner covered the area with gravel—EPA recommended leaving this in place and avoiding disturbance. Vermiculite was identified in the mortar and bricks along the perimeter of the former veneer dryers, which was also removed in 2010.

- Former popping plant area: In 2011, soil was excavated in this area at depths ranging from 12 inches to 36 inches bgs. The final sampling summary showed LA results ranging from non-detect to 2% at excavation depth (CDM Smith 2016). During the final site inspection, it was noted that LA is likely present below the backfilled areas at excavation depth. If any future work is completed in this area, plans for encountering LA should be considered.

- Former nursery area: In 2012, soil was excavated in this area at depths ranging from three inches to 36 inches bgs. The final sampling summary showed LA results ranging from non-detect to less than 1% at excavation depth. Currently, engineered controls for use at the site consist of a chain link fence installed by the EPA to isolate the former nursery area. The former nursery area is identified on Figure 1-3.

- Finger jointer building: This area was not inspected during the final site inspection. In 2000 and 2005, the owner of the building conducted removal of LA source materials throughout the structure, including the lunch room and bathroom. The work performed by the property owner was completed outside of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and EPA's response at the site. In 2010, the EPA conducted removal actions to address contaminated soil in areas around and within the valve house of the finger jointer building. VCI was also removed from the valve house and air clearance samples were collected (CDM Smith 2016). On November 5, 2017, the finger jointer building was burned by a fire.

- Libby Creek: In 2009, response actions were completed to remove contaminated soil and rip rap containing LA. Approximately 499 yd^3 were removed, rip rap was placed, and the area backfilled with 244 yd^3 of clean material (CDM Smith 2016).

- Areas not inspected during the final site inspection: The final site inspection was limited to those areas discussed above; other areas within OU5 were not included (CDM 2016). These areas include the sewer and storm water lagoons, the Mill Pond MotoX area, the Champion International Paper area, the Stinger welding building, and the River Country Wood Products operations.

Currently, vermiculite and LA are present in site surface and subsurface soil, as depicted in Figures 1-3, 1-4a, and 1-4b.

1.2 Current Site Information

1.2.1 Parcel Ownership and Land Use Information

Parcel ownership information was collected from Montana Cadastral at the following web link: http://svc.mt.gov/msl/mtcadastral/.

1.2.1.1 Kootenai Business Park Parcel Contact Information

Owner: Lincoln County Port Authority
PO Box 1071
Libby, MT 59923

The property is currently listed as an industrial site and is being used primarily for industrial development and some commercial and recreational purposes.

1.2.1.2 Motocross Track Parcel Contact Information

Owner: Millpond Motocross Association Inc.
PO Box 1000
Libby, MT 59923

The property is currently listed as rural land and is being used for recreational purposes.

1.2.1.3 International Paper Parcel Contact Information

Owner: International Paper Co
PO Box 2118
Memphis, TN 38101

The property is currently listed as an industrial site, which includes the Libby Groundwater Superfund Site remedial operations, and is being used for industrial purposes. There are currently no plans to develop the property.

1.2.1.4 Flathead Substation Parcel Contact Information

Owner: Flathead Electric Cooperative Inc.
2510 US Highway 2 E
Kalispell, MT 59901

The property is currently listed as centrally assessed non-valued and is currently being used for an electrical substation. It is anticipated that the property will continue to be used for industrial purposes.

1.2.1.5 Stinger Welding Montana Inc. Contact Information

Owner: Stinger Welding Montana Inc.
Mail to: Timothy Priebe
Dickinson, ND, 58602-1034

Stinger Welding: The property is currently listed as an industrial property that was formerly being used for industrial welding operations, but is currently vacant.

1.3 Operation and Maintenance Responsibility

Responsibility for O&M at OU5 is shared among several agencies and stakeholders. To determine whether the remedy at the site is protective of human health and environment, the EPA is responsible for conducting five-year reviews. Section 5 summarizes the five-year review process and associated requirements. For OU5, annual inspections will be performed, at a minimum, and are the responsibility of the DEQ. Activities to be performed during inspections may include visual inspections, remedy repair and maintenance, sampling and analysis, evaluation of institutional controls (ICs), and reporting. These activities are discussed in further detail within subsequent sections of this plan. In addition, general property maintenance and management will be the responsibility of the property owner to ensure activities on their property does not disturb the physical protective remedy in place. Figures 1-4a and 1-4b show soil removal areas that were backfilled and depict remaining vermiculite and LA present in subsurface soil. Information will be provided to assist property owners and their contractors in understanding the appropriate best management practices (BMPs) and ICs that apply to their properties (EPA 2016a). The Asbestos Resource Program (ARP) assists with providing property owners and contractors with information regarding properties and appropriate BMPs. The ARP is described further in Section 2.4.

1.4 Identification of Available Funding for Operation and Maintenance

A settlement fund was set up for the Site. From the settlement fund, 11 million dollars was placed into a separate interest-bearing account that will be used to help pay for future site-wide O&M. Currently,

the funds in that account are nearly $11.8 million. The cost of the site-wide O&M program will be evaluated through a cost-risk analysis to help minimize uncertainty associated with those costs.

1.5 Statement of Basis and Purpose

The purpose of this O&M Plan is to present the activities necessary for inspecting, operating, and maintaining the effectiveness of the OU5 RA, including administrative, financial, and technical details and requirements. This O&M Plan and the Institutional Control Implementation and Assurance Plan (ICIAP, EPA 2016b) will be reviewed and revised as appropriate after the site-wide IC program is implemented.

1.5.1 Operation and Maintenance Objectives

The implementation and maintenance of the remedial measures, in accordance with the O&M Plan, are designed to meet the following remedial action objectives, as discussed in the ROD (EPA 2016a):

- Minimize the inhalation of LA during disturbances of soil contaminated with LA such that the resulting exposures result in cumulative cancer risks that are within or below EPA's acceptable risk range of 10^{-6} to 10^{-4} and cumulative non-cancer hazard index (HI) that is at or below 1.0.
- Minimize the inhalation of LA during disturbances of building materials contaminated with LA such that the resulting exposures result in cumulative cancer risks that are within or below EPA's acceptable risk range of 10^{-6} to 10^{-4} and cumulative non-cancer HI that are at or below 1.0.

O&M objectives for OU5 are listed as the following:

- Maintain the integrity of the physical remedies and engineered controls.
- Monitor, evaluate, and update ICs to ensure protectiveness. ICs for this OU5 O&M Plan are detailed in the *Former Stimson Lumber Mill Export, Operable Unit 5, Institutional Control Implementation and Assurance Plan* (EPA 2016b).

1.5.2 Summary of Long-Term O&M Activities

Long-term O&M (i.e., O&M efforts to be conducted for an indefinite period into the future) will be performed to maintain the integrity of the remedy components (protective covers, backfilled areas, containment of contaminated building materials), and ICs will be implemented.

Prior to any onsite O&M work, it is recommended that a Health and Safety Plan (HASP) be developed by the entity conducting the work or an existing HASP (pertaining to the work required) adapted. All O&M work should be performed in compliance with the appropriate HASP. This plan should include provisions for responding to and reporting accidents involving site personnel, operating emergencies, and other unusual events such as fires, floods, or weather damage.

The following activities will be considered routine O&M activities:

- **OU5 Site Inspections.** Non-intrusive visual site inspections will be conducted to ensure integrity of the physical remedy and engineered control remains intact. OU5 site inspections are assumed to be performed at least annually, as well as concurrently with five-year site reviews. OU5 site inspections are discussed in Section 2.

- **Physical Remedy and Engineered Control Maintenance.** Damage to a physical remedy or engineered control observed during annual OU5 site inspections will be identified for repair as described in Section 2 to mitigate exposure to underlying/inlying contamination. Physical remedy and engineered control maintenance is discussed in Section 2.3, including issues that may arise with the physical remedy or engineered control during long-term O&M, and contingency plans for damage to the physical remedy or engineered control.
- **ICs Evaluation and Updates.** As part of the annual O&M inspection, ICs will be evaluated on at least an annual basis and updated if necessary to ensure protectiveness. Evaluation and updates for different types of ICs are discussed in Section 3.
- **Reporting.** Reports summarizing O&M activities will be prepared on an annual basis. Annual reporting also involves regular review and updates as necessary to any O&M HASPs, as described in Section 2.2, and as-built drawings prepared during the reporting period. Development and review of HASPs for O&M at OU5 are recommended for the protection of workers at the site and are the responsibility of the entity performing work under each respective HASP. Reporting requirements are discussed in detail in Section 4.

1.6 Overview of Transition from Remedial Action to Operation and Maintenance

A remedy becomes operational and functional (O&F) either one year after construction is complete, or when the remedy is determined concurrently by the EPA and the state to be functioning properly and is performing as designed, whichever is earlier (EPA 2001a). EPA considers RA at OU5 to be complete, as previous removals meet the remedy requirements.

1.6.1 Schedule for Transition from Remedial Action to Operations and Maintenance

Table 1-1 presents a summary of the major events for transition from RA to O&M at OU5, and associated dates of these events. See Section 2 of the *Final Remedial Action Report, Operable Unit 5 – The Former Stimson Lumber Mill* for a summary of all investigation and removal activities that occurred prior to the ROD. For OU5, a site inspection occurred in spring 2016, and the beginning of the one-year O&F period began in fall 2016. In addition, as previously discussed, a site walkthrough/inspection occurred in August 2017. As shown in Table 1-1, the first annual O&M site inspection is anticipated in 2018.

1.6.2 Land Use Review

There is a potential for land use at OU5 to change in the future. If future development were to occur necessitating a change in land use category as described in the ROD, the property owner will submit a land use review form to the ARP. A land use review form will be used to assess whether the new use impacts the integrity of the remedy or would have the potential to change the receptor exposure to LA contamination from acceptable (based on the current use scenario) to unacceptable (based on the future use scenario). Based on the land use review, the ARP, in consultation with DEQ, will make the final determination on whether a land use change is appropriate and what actions are required to facilitate the change (e.g., sampling, monitoring, analysis). An example land use review form is provided as Appendix A.

Table 1-1 Summary of the Major Events for Transition from Remedial Action to Operation and Maintenance

Date	Event
December 2001	Site interview
May 2002	Begin OU5 investigation sampling activities
June 2013	Remedial investigation completion
November 2013	Completion of removal activities
May 2015	OUs 4-8 Feasibility Study completion (includes OU5)
February 2016	OUs 4-8 Record of Decision signed (includes OU5)
August 2016	ICIAP approval
September 2016	Final RA report completion
September 2016	Start of O&F
August 2017	Final OU5 site inspection
September 2017	End of O&F
TBD (estimated Fall 2017)	O&M Plan approval
TBD (estimated 2018)	First annual O&M site inspection
TBD (estimated 2018)	First annual O&M report
TBD (estimated Spring 2020)	Five-year review *(Five-year reviews will be done concurrently with site-wide five-year reviews. The first site-wide review was completed June 22, 2015.)*

TBD – to be determined

Annual O&M site inspections, annual O&M reporting, and five-year reviews will be conducted indefinitely, as long as contaminants remain onsite at levels that call for restricted uses and limited exposure.

1.6.3 Access

A majority of OU5 is owned by the LCPA and will continue to be used for industrial, commercial, and recreational purposes. Areas within OU5 that are owned by entities other than the LCPA include the MotoX track owned by the Millpond Motocross Association Inc., the Libby Groundwater Superfund site owned by the International Paper Co., the Stinger welding building owned by Stinger Welding Montana, Inc., and an electrical substation owned by the Flathead Electric Cooperative.

Access agreements for conducting long-term O&M have not been obtained, but may be required for each property owner located within the OU5 boundary. When access is required to conduct O&M at OU5, property owners will be notified and access will be obtained as necessary by each entity requiring access. An example of a legal instrument that can be used to obtain access is an easement that provides access rights to and from a property for inspecting and monitoring the protective system. A method by which access can be obtained is through implementation of proprietary controls. Proprietary controls are described in Section 3.1.

When intrusive work is required within the right-of-way (ROW) of US Highway 2, a Montana Department of Transportation (MDT) encroachment permit application will be completed. A copy of

the MDT encroachment permit and addendum is provided in Appendix B. The MDT encroachment permit application and addendum is discussed further in Section 3.3.

1.6.4 Summary of Staffing Needs

Staffing for O&M at OU5 primarily consists of DEQ personnel performing annual site inspections and EPA personnel and/or contractors performing five-year reviews.

Pursuant to the Occupational Safety and Health Administration (OSHA), all persons engaged in operations under this O&M Plan shall follow OSHA regulations, as specified in 29 Code of Federal Regulations *Hazardous Waste Operations and Emergency Response* (HAZWOPER) 1920.120. In general, persons conducting O&M activities under this plan shall have, at a minimum, twenty-four hours of initial HAZWOPER training, and one day of supervised hands-on training or a current eight-hour annual refresher. In some instances, 40 hours of HAZWOPER training may be required, which should be outlined in a recommended HASP for each entity performing work at the site.

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Section 2
Site Inspections

Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy and the site (EPA 2001a). The DEQ will conduct site inspections (e.g., annual site inspection) for OU5. The recommended O&M annual site inspection checklist is provided as Appendix C.

2.1 Site Inspection Objectives

Consistent with the O&M objectives presented in Section 1.5.1, the objectives of OU5 site inspections include the following:

- Observe and maintain the integrity of the engineered controls and physical remedies (e.g., protective covers or backfilled areas, encapsulated/sealed building materials) to ensure that the protection of human health is maintained.
- Evaluate the implementation of ICs to ensure protectiveness, as described in Section 3.

2.2 Observe Site Conditions

Monitoring protocol includes non-intrusive visual site inspections to ensure integrity of the physical remedies and engineered controls. Site inspections will be performed annually, as well as concurrently with the five-year review, according to the proposed O&M schedule presented in Section 1.6.

2.2.1 Inspect the Integrity of Physical Remedies and Engineered Controls

A non-intrusive (surficial) visual inspection of the immediate ground surface and remedies completed within the interior of buildings at the site will be conducted during the annual site inspection to determine if the physical remedy or engineered control applied remains intact. The types and location of the physical remedies and engineered controls for OU5 are detailed in the *Final Remedial Action Report, Operable Unit 5 – The Former Stimson Lumber Mill* (CDM Smith 2016).

Site inspections will be performed annually and will involve observing whether the backfills, vegetation, and encapsulation of contaminated building materials are intact and prevent exposure to LA-containing material. Inspections will be conducted by persons properly trained in accordance with Montana Code Annotated (MCA) 75-2-511. If LA-containing material or debris is observed, or damage to the physical remedy or engineered control has occurred, they will be identified for repair as described in Section 2.3.

Additional engineered controls, such as fencing or working signs restricting access for use at the site (e.g., the chain link fence installed by the EPA to isolate the former nursery area), will be inspected for damage.

2.2.2 Other Site Features

As dictated by the ROD, multiple buildings, soil areas, parking surfaces, and roads at OU5 have not required response actions to remove, block, or encapsulate contaminated material; therefore O&M of

these areas will not be required. Instead, the ICs discussed in Section 3 and *The Former Stimson Lumber Mill, Operable Unit 5, Institutional Control Implementation and Assurance Plan* (EPA 2016b) will be used to address these areas and potential asbestos exposures. Response actions completed within surface soil and buildings on the site are detailed in the *Final Remedial Action Report, Operable Unit 5 – The Former Stimson Lumber Mill* (CDM Smith 2016).

2.3 Physical Remedy and Engineered Controls Maintenance Activities

Damage to physical remedies and engineered controls could result from erosion, vandalism, motor vehicle traffic, authorized or unauthorized digging, and/or deteriorating encapsulated building material. Damage to physical remedies and engineered controls at OU5 can result in exposure to LA-containing material that would result in unacceptable risk. Further guidance regarding funding for remedy maintenance activities during the O&M period are discussed in the *Directive on Paying for Remedy Repairs or Modifications during the State-Funded Period of Operation and Maintenance Memorandum* (EPA 2007).

For the purposes of this document, "breaches" are defined as any action or event that results in the breaking, failing, or damage to a physical remedy or engineered control. A minor breach of the physical remedy can be repaired without additional excavation of contaminated soil or removal of contaminated building materials. A major breach of the physical remedy occurs when significant exposure to contaminated soil beneath the backfill or contaminated building material may result, and additional excavation, removal, or encapsulation of contaminated materials would be required. Prior to implementing any corrective action, it is recommended that a HASP be developed or existing HASP be revised specific to the work performed by the entity performing work.

In general, if LA or LA-contaminated material is encountered or suspected during inspection of the physical remedy or engineered control at OU5, the DEQ or designee will:

- Take necessary measures to secure the disturbed areas and to limit contaminant migration from inadvertent activities so that the protection of human health is maintained through restriction of access to the area.
- Contact the ARP. Section 2.4 further describes the responsibilities of the ARP.
- Ensure corrective action is taken to repair the physical remedy or engineered control, as further described in the following subsections.

2.3.1 Repair of Minor Breaches to the Physical Remedy and Engineered Controls

General wear and tear or erosion may result in a minor breach of the physical remedy or engineered control. General wear and tear may include rutting and cracking on ground surfaces from heavy equipment such as snow plows, damage to the grass due to foot traffic, or deteriorating building material encapsulation/sealing/blocking. If the physical remedies can be repaired without additional excavation of contaminated soil or removing/adding building materials, it is considered a minor breach. This type of breach to a physical remedy may or may not result in exposure to LA-containing material or debris. The DEQ, with assistance from ARP, will determine if a repair is required due to a minor breach.

Repair of a minor breach of soil physical remedies and application of engineered controls will follow the general steps described below:

- Obtain clean fill material from an approved offsite (outside of the Libby valley) borrow source, that is analyzed in accordance with the *Fill Material Quality Assurance Project Plan, Libby Asbestos Superfund Site* (CDM Smith 2017) to ensure it is within specifications for the respective fill type and not contaminated with LA.
- Transport, place, and compact the fill material.
- Hydro-seed or resurface the backfilled area as necessary.

Repair of a minor breach of building material physical remedies will follow the general steps described below:

- Utilize appropriate resources for blocking, sealing, or encapsulating building materials, as guided by the *Response Action Work Plan, Revision 9.0, Libby Asbestos Site* (PRI-ER 2017).

Additional information regarding BMPs pertinent to repair of minor breaches of building material physical remedies and engineered controls are available in Appendix D. This information is also presented in an attachment to *The Former Stimson Lumber Mill Export, Operable Unit 5, Institutional Control Implementation and Assurance Plan* (EPA 2016b).

Any additional modification or renovation to the physical remedy or engineered control is the responsibility of the property owner. Modifications or renovations where LA-contaminated soil or building materials are encountered will follow the guidance stated in the *Response Action Work Plan Revision 9.0, Libby Asbestos Site* (PRI-ER 2017).

The DEQ is responsible for ensuring that the minor breach repair is completed in accordance with BMPs (Appendix D) and the methods included in the *Response Action Work Plan, Revision 9.0, Libby Asbestos Site* (PRI-ER 2017), and that proper fill material is used per the *Fill Material Quality Assurance Project Plan, Libby Asbestos Superfund Site* (CDM Smith 2017).

2.3.2 Repair of Major Breaches to the Physical Remedy and Engineered Controls

A major breach of the physical remedy or engineered control will result in significant exposure from contaminated soil or building materials. Additional excavation of contaminated soil or construction of building/area containment may be necessary to secure the disturbed areas so that the protection of human health is maintained and contaminant migration does not occur. The DEQ, with assistance from ARP, is responsible for making the determination of breach severity.

Contaminated soil or building materials exposed by a major breach will be excavated/remediated and disposed of at an approved facility. For soil breaches, sampling and analysis may be conducted to confirm that contamination did not migrate outside of the breached area. For building breaches, sampling and analysis may be performed to confirm the breached area is within acceptable criteria for access/use and or did not migrate outside of the breached area.

Any additional modification or renovation to the physical remedy or engineered control is the responsibility of the property owner. Modifications or renovations where LA-contaminated soil or

building materials are encountered will follow guidance as stated in the *Response Action Work Plan Revision 9.0, Libby Asbestos Site* (PRI-ER 2017).

The DEQ is responsible for ensuring that the major breach repair is completed in accordance with BMPs (Appendix D) and the methods included in the *Response Action Work Plan, Revision 9.0, Libby Asbestos Site* (PRI-ER 2017), and that proper fill material is used per the *Fill Material Quality Assurance Project Plan, Libby Asbestos Superfund Site* (CDM Smith 2017).

2.4 Future Encounters with Contaminated Material

If disturbance of the protective physical remedy or engineered control causes exposure, advice on how to address encounters with contaminated materials will be obtained from the EPA, DEQ, or ARP. The ARP is a program staffed in Lincoln County, Montana for an interim period and funded by the EPA through 2021 under a cooperative agreement with Lincoln County. ARP was developed as an interim program to educate the public regarding the remaining risks of LA exposure, provide resources to manage the risks associated with LA exposure, and implement initiatives to reduce or prevent the risk of LA exposure. ARP works under the direction of the City-County Board of Health for Lincoln County (BOH)[1].

ICs, such as informational devices, as described in Section 3.4, will be used to inform the property owners, tenants, and land users of proper actions to avoid and how to handle future encounters with contaminated soil and building materials at the site.

Additional information regarding BMPs is provided in Appendix D and available as an attachment to *The Former Stimson Lumber Mill Export, Operable Unit 5, Institutional Control Implementation and Assurance Plan* (EPA 2016b).

If the material encountered was not reasonably anticipated prior to the start of O&M, EPA and DEQ will evaluate whether the material represents an unforeseen site condition and determine how the response action will be funded (EPA 2016a). An unforeseen site condition is defined as a significant deposit of LA that was not previously characterized and was not in an area that was expected to have LA.

In certain site-specific circumstances, the EPA may determine that it is appropriate to pay or partially pay for certain repairs or modifications to remedies even though DEQ has assumed responsibility for O&M. When evaluating whether it is appropriate for the EPA to pay some or all the costs to repair or modify a remedy after DEQ has assumed responsibility for O&M, the EPA should consider whether:

- A latent design or construction defect in a remedy that affects protectiveness is discovered after the construction has been completed and O&M has begun;
- A new, previously not identified contaminant of concern is discovered, which necessitates a fundamental change to the ROD; or
- An Applicable or Relevant and Appropriate Requirement (ARAR) change requires a more stringent cleanup level than the one established in the ROD.

[1] BOH will be involved in the process of developing and determining site-wide ICs. Site-wide ICs have yet to be fully established at the time of this plan approval.

If the remedy is damaged by some form of natural disaster, then DEQ should be prepared to make the necessary repairs. Federal disaster funds may be made available if the area has been declared a disaster under the Stafford Act (EPA 2007).

Section 3

Monitor Institutional Controls

ICs are non-engineering measures designed to prevent or limit exposure to hazardous substances left in place at the OU5 site.

The EPA has developed an ICIAP to ensure ICs applicable to OU5 are properly documented, implemented, and operating effectively during their entire lifespan. In accordance with the EPA guidance document, *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites* (EPA 2012), the ICIAP identifies the objectives, performance goals, existing or anticipated enforcement documents and approaches for enforcement that are currently in place on the site (EPA 2016b).

The ICs will be evaluated on an annual basis and updated as appropriate. The routine and critical evaluation of the ICs will assess:

1. Whether the selected IC instruments remain in place.
2. Whether the ICs are enforced such that they meet the stated objectives and performance goals and provide protection required by the response.

At the OU5 site, modification of ICs may be required in the event of a change in land use or ownership. If an event occurs that could lead to a modification, this plan will be reviewed and revised accordingly to ensure the ICs at the site continue to provide adequate protection. If ICs need to be revised, the DEQ will notify the EPA to facilitate a revision to the ICIAP. Although it is not anticipated for this site, termination of ICs may occur if all remaining contamination at the site is removed to a level below that which poses a risk to health and the environment.

The following sections present current ICs and maintenance procedures. According to guidance, ICs are more effective if they are layered, meaning the use of different types of ICs at the same time to enhance the protectiveness of the remedy (EPA 2012). For example, where ICs must be effective for a long period, either proprietary or governmental controls will be considered because they run with the land and are enforceable. Also, the implementation of government controls might be considered a beneficial addition to information tools that may be forgotten over the long-term or an enforcement action that would be binding only on certain parties (EPA 2012).

Specific details regarding the types of ICs and the IC instruments currently in place at OU5 are summarized below and outlined in *The Former Stimson Lumber Mill Export, Operable Unit 5, Institutional Control Implementation and Assurance Plan* (EPA 2016b).

The following types of ICs and associated instrument(s) currently in place or anticipated at OU5 are listed below:

- Proprietary Control – DEQ Environmental Covenant
- Governmental Control – Montana state law (MCA 2013, 69-4-503), known as the Montana One-call notification center (U-Dig)
- Enforcement and Permit Tools – MDT encroachment permit application and Libby Addendum

- Informational Devices – DEQ, ARP, and EPA Site website, the EPA Information Center (in Libby), LCPA's Property Management Plan (Trihydro 2016), BMP Manual (Appendix D), and this O&M Plan

3.1 Proprietary Controls

Proprietary controls are created pursuant to state law to prohibit activities that may compromise the effectiveness of the response action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment (EPA 2012).

3.1.1 Evaluate and Update Proprietary Controls

Both the administrative/legal components of proprietary controls and the physical evidence will be evaluated annually by DEQ. One method to evaluate the administrative components of proprietary controls is to perform a title search on the properties within the OU5 area and determine if the land or resource use restrictions are appropriately documented in the chain of title of the property. Proprietary controls can also be evaluated during site inspections through physical evidence of property encroachment or possible violations of land or resource use restrictions.

3.2 Governmental Controls

Governmental controls are used to impose restrictions on land use or resource use (EPA 2012). Local governments have a variety of land use government controls to limit land or resource use including zoning restrictions, ordinances, statutes, or building permits (EPA 2012). However, once implemented, local and state entities often use traditional police powers to regulate and enforce the controls. Since this category of ICs is put in place under local jurisdiction, they may be changed or terminated with little notice, and the EPA generally has no authority to enforce such controls (EPA 2012).

Montana state law (MCA 2013, 69-4-503) requires that all parties planning to excavate, drill, or perform other subsurface activities, notify the designated one call notification center (e.g., U-dig) prior to the start of these activities. The ARP is notified by the U-Dig call center for all activities planned within OU5 boundaries. Advice on how to address the contamination, if disturbance is required, would be obtained from the ARP. In addition to providing advice and instruction, ARP will assist with management of contamination encountered, as necessary. Assistance in managing contamination may include providing resource materials and BMPs, contractor referrals, and/or removal of contamination.

3.2.1 Evaluate and Update Governmental Controls

Because land use and ownership changes can occur over a relatively short time, developers and other parties may not be fully aware of the ICs that have been put in place as part of a cleanup. Both the administrative/legal components of government controls will be updated. Government controls will be evaluated during the annual site inspection to identify any changes in land use.

3.3 Enforcement and Permit Tools

Enforcement and permit tools such as administrative orders, permits, federal facility agreements, and consent decrees, are legal tools that limit certain site activities or require the performance of specific activities (e.g., to monitor and report on an IC's effectiveness) (EPA 2012).

Enforcement documents related to OU5 include an MDT encroachment application and permit. All individuals and organizations intending to perform work within the ROW of US Highway 2 must apply for an encroachment permit with the MDT. Any application for the OU5 ROW along US Highway 2 is accompanied by an addendum, which notifies the permittee to take precautions to guard against potential exposure to LA contamination (CDM Smith 2016).

3.3.1 Evaluate and Update Enforcement and Permit Tools

Evaluation of current enforcement and permit tools implemented within OU5 will be conducted during annual site inspections completed by the DEQ. The DEQ shall refer to the current version of the ICIAP for any implemented enforcement and IC evaluation needs and revise or update as necessary.

3.4 Informational Devices

Informational devices provide information or notification to local communities that contained contamination remains on site (EPA 2012). Current informational devices related to OU5 are summarized below:

- ARP is utilized as a method to educate the public regarding the remaining risks of LA exposure, to provide resources to manage the risks associated with LA exposure, and to implement initiatives to reduce or prevent the risk of LA exposure. Assistance in managing contamination may include providing resource materials and BMPs, making contractor referrals, and/or removing contamination. The ARP is available for any persons interested in information regarding LA, or resources available to minimize risks associated with LA. Interested persons are encouraged to contact the ARP at 406-291-5335 or visit the ARP website at http://www.lcarp.org.

- The EPA Site website is maintained to provide information for the public regarding current activities associated with the Libby Superfund Site at http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0801744.

- EPA Information Center contains all information for OU5 (historical and current site documents) and any associated BMPs. This informational device will be maintained by the EPA or another government organization into the future.

- A BMP Manual (Appendix D) was developed as a means and method, that when used in combination with developed ICs, provides guidance to owners, land users, tenants, and visitors for the prevention or reduction in the release of and/or exposure to LA within OU5.

- The LCPA Property Management Plan (Trihydro 2016) is an informational device and management tool used by LCPA to protect the remedy and prevent exposure. Other property owners within OU5 may elect to develop a Property Management Plan or similar document to ensure management of their owned parcels within the OU are protective of the remedy.

3.4.1 Evaluate and Update Informational Devices

The effectiveness of the ARP, EPA Site website, BMP Manual, LCPA Property Management Plan (Trihydro 2016), and the EPA Information Center will be evaluated on an annual basis to improve accessibility, navigability, content, and technical functionality. These informational devices will be updated if deficiencies are found or if technical aspects are changed.

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Section 4
Reporting Requirements

Further described in Section 5, five-year review reports will be completed by the EPA on a five-year cycle, with the initial schedule presented in Table 1-1 and in accordance with *Comprehensive Five-Year Review Guidance* (EPA 2001b). Reports on O&M activities will be generated on a routine basis and as required by unforeseen events (described below). EPA will review the reports on an ongoing basis.

Annual reports summarizing O&M activities will be prepared by DEQ and submitted to the EPA remedial project manager (RPM) and the OU5 property owners listed in Section 1.2.1 on an annual basis.

Annual reports may include sections on results from routine inspections; listing of major repairs; any reported updates of relevant HASPs, O&M manuals and as-built drawings; community complaints and responses; and verifications of the integrity of ICs.

In the event any instrument of ICs for OU5 are found to be inadequate, need to be modified, or additional ICs are necessary to ensure protectiveness of the remedy, that information will be included within the site annual inspection report prepared by the DEQ.

These reports will assist the DEQ and EPA in evaluating the adequacy of O&M, the frequency of repairs, and how these factors relate to determining and ensuring protectiveness of the remedy.

4.1 Special Reports

The DEQ will prepare special reports as needed due to unforeseen events or conditions and will be based on the magnitude of the event as determined by the DEQ. One example of a special report is an incident report. Incident reports are used to document the details of accidents involving site personnel, and other unusual events such as fires, floods, or weather damage. Another example of a special report is a record of modification or amendment to a HASP. When accidents occur on site, any HASP that has been developed may need to be updated depending on the type of incident and whether it is already covered in the plan. These special reports should be made available to the EPA, the appropriate OU5 property owner, and other interested parties in a timely manner (EPA 2001a).

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Section 5
Summary of Five-Year Review Activities

LA will remain onsite above levels that allow for unrestricted use of OU5. Additionally, the levels of LA remaining onsite are not considered in exceedance of RA levels and remedies are in place that are considered protective. However, LA does exist beyond protective remedies, which could pose a risk in the event those remedies are disturbed. Five-year reviews of OU5 will be required to evaluate the implementation and performance of the remedy and to determine whether the remedy remains protective of human health and the environment. The EPA is responsible for performing and funding the five-year reviews as long as they are required. The remedy will be re-evaluated in accordance with the review requirements of CERCLA Section 121(c). The five-year review process consists of six components: 1) community involvement and notification, 2) document review, 3) data review and analysis, 4) site inspection, 5) interviews, and 6) protectiveness determination (EPA 2003).

- Community involvement activities will include notifying the community that the five-year review will be conducted, notifying the community that the five-year review has been completed, and providing the results of the review.
- Document review involves a review of all relevant documents and data to obtain information to assess the performance of the response action. Documents for review include the ROD (EPA 2016a), annual O&M reports, and annual IC evaluations conducted as part of the annual site inspection.
- Data review and analysis will involve a review of sampling and monitoring plans and results from monitoring activities.
- Site inspections will be conducted to gather information about the site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area.
- Interviews may be conducted as necessary with the site manager, site personnel, and people who live or work near the site to gather additional information about the site's status or identify remedy issues.

Reports summarizing the five-year review will be prepared by the EPA in accordance with the *Comprehensive Five-Year Review Guidance* (EPA 2001b).

Section 6

Cost Estimate

As part of the O&M Plan, a cost estimate is developed to address all the O&M activities discussed in this report. The O&M cost estimate, provided in Appendix E, was primarily developed to provide EPA and the DEQ with a preliminary cost basis for routine and non-routine remedy maintenance, annual site inspections, and cost for five-year reviews.

6.1 Purpose and Intended Uses

The O&M cost estimate reflects the annual and periodic costs for implementing the long-term O&M at the OU5 site.

The intended use of the O&M cost estimate is to support EPA and the DEQ in the development and preparation of the annual O&M budget for the OU5 site. The O&M cost estimate is also used to help EPA and DEQ management understand the costs associated with implementing the long-term O&M at OU5, and helps in developing the cooperative agreement work plan.

6.2 Methodology and Organization

The O&M cost estimate is based on the selected remedy (alternatives SO6 and BM5) cost estimate prepared in 2015 for the ROD (EPA 2016a). Because the ROD took a holistic approach and included a selected remedy cost estimate of combined OUs (i.e., OU4, OU5, OU6, OU7, and OU8), an O&M cost estimate specific to OU5 was prepared for this O&M Plan. The selected remedy cost estimate was developed according to *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000).

The O&M cost estimate consists of cost worksheets, a cost summary, and a present-value analysis. The cost worksheets provide the costs for individual O&M components. The cost summary includes annual O&M costs and other periodic costs for the long-term O&M. It also includes contingencies and professional/technical services costs (excluding remedial design costs). Present-value analysis of the estimated O&M cost was also developed. For this, a period of thirty-years was assumed, although the O&M will be conducted indefinitely throughout the life of the site.

Present-value analysis is a method to evaluate expenditures, either capital or O&M, which occur over different time periods. The single-cost figure, referred to as the present value, is the amount needed to be set aside at the initial point in time (base year) to assure that funds will be available in the future as they are needed, assuming certain economic conditions. Inflation was first applied to annual costs prior to the present-value analysis. Inflation was based on the U.S. Army Corps of Engineers (USACE) Civil Works Construction Cost Index System yearly composite cost index (weighted average). The discount rate for present value analysis was based on the 10-year average of nominal thirty-year treasure interest rates (Appendix C of Office of Management and Budget Circular A-94, revised November 2011).

6.3 Cost Estimates Accuracy and Cost Uncertainty

The O&M cost estimate is developed to be as accurate as the current information allows and is based on the scope presented. The cost estimate is expected to have an accuracy of -30% to +50% of the

actual costs. This cost accuracy range is consistent with EPA's *Remedial Design/Remedial Action Handbook* (EPA 1995) for preliminary development of O&M activities and responsibilities. Currently this cost estimate is an *Opinion of Probable Cost* only, and further refinement of the cost estimate will be done after additional inputs are gained from the stakeholders.

The O&M cost estimate does not include costs associated with facilitating specific EPA contracting vehicles (e.g., interagency agreements or design and engineering services contracts), and as such, will not be covered under O&M funds. Typical costs include program management costs, general and administrative costs, and subcontracting costs and fees. In addition, costs incurred for the EPA to conduct five-year reviews will not be paid out through the separate interest-bearing account used for future site-wide or OU5 O&M. Because the EPA five-year review costs are not allocated through the O&M fund, they have been presented in a separate table (Table 6-2).

6.4 O&M Cost Estimate

As stated above, this is a probable cost of O&M. The actual cost may be lower depending on whether the DEQ can find cost efficiencies in implementing the O&M at OU5.

The O&M cost estimate (cost worksheets, cost summary, and present value analysis) is presented in Appendix E of this O&M plan. The following tables present the summary of the O&M cost estimates.

Table 6-1 Summary of Probable Operations and Maintenance Cost

Probable O&M Cost Type	Description	Cost
Routine Annual Cost	Includes routine site inspection, evaluating and updating ICs, and physical remedy/engineered control maintenance – minor breaches.	**$36,000/year**
Routine and Non-Routine Periodic Cost	Includes periodic cost and physical remedy/engineered control maintenance – major breaches.	**$59,000/3 years**

Notes:

1. Detailed costs and backup are presented in Appendix E.
2. Costs are rounded to the nearest $1,000.
3. Costs based on 2016 prices.
4. Costs presented are expected to have accuracy between -30% to +50% of actual cost, based on the scope presented.

Table 6-2 Summary of Probable EPA Five-Year Review Cost

Probable O&M Cost Type	Description	Cost
EPA Five-Year Review[1]	Includes community involvement and notification, document review, data review and analysis, site inspection, interviews, and protectiveness determination.	**$44,000/event**

[1]Costs incurred for the EPA to conduct five-year reviews is not covered under O&M funds.

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Section 7
References

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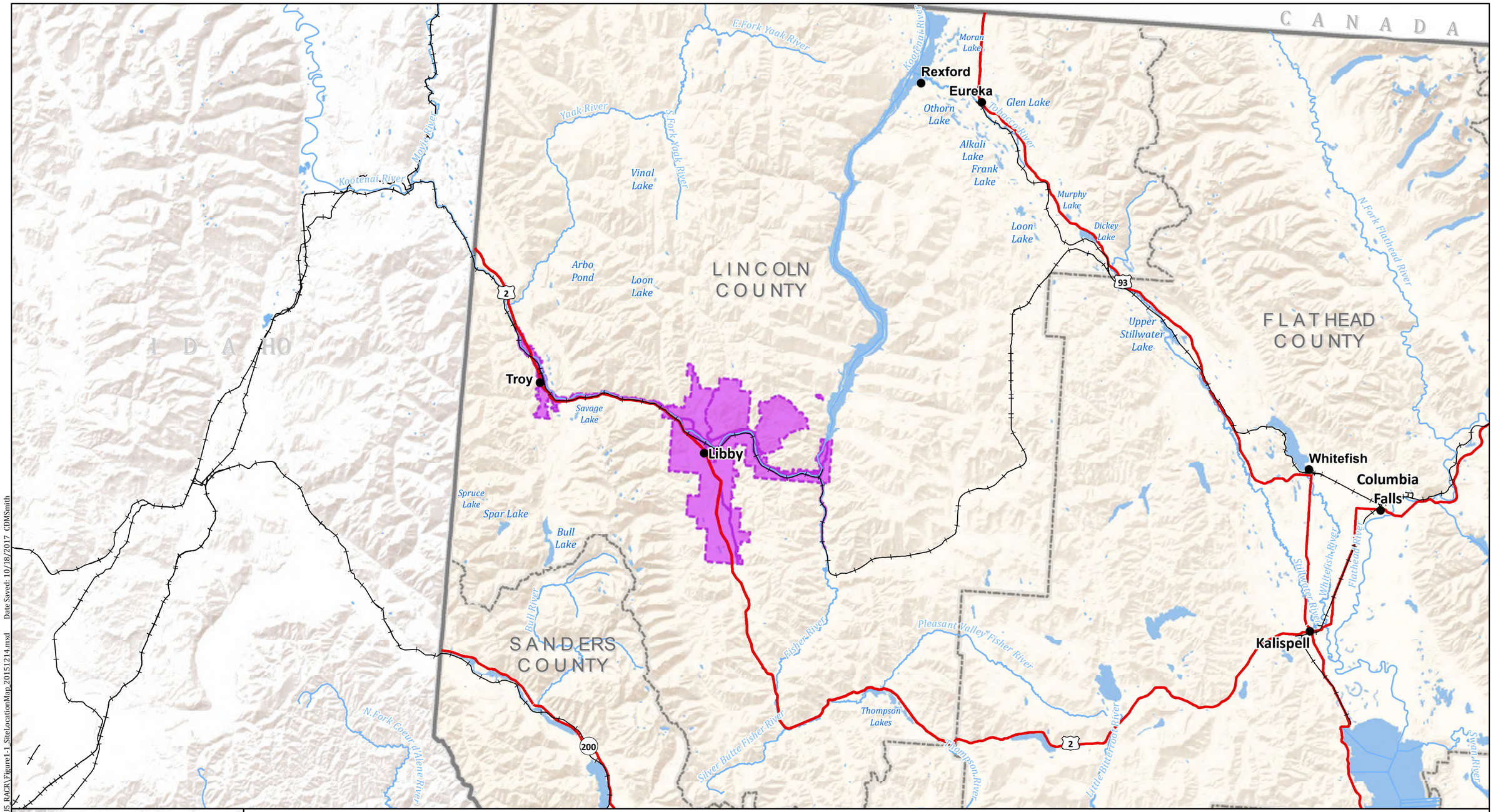
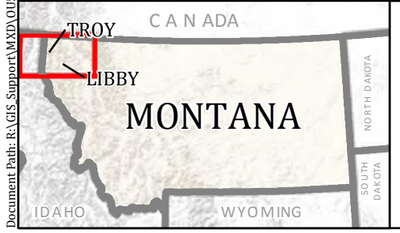
Figures





City
Railroad
Highway
River
Waterbody
Libby Asbestos Superfund Site

Background Terrain Sources: Esri, USGS, NOAA
Road and Railroad Source: US Census Tiger/Line
Waterways and Waterbodies Source: National Hydrography Dataset - USGS

Figure 1-1
Site Location Map
Libby Asbestos Superfund Site | Lincoln County, MT

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Miles

CDM Smith

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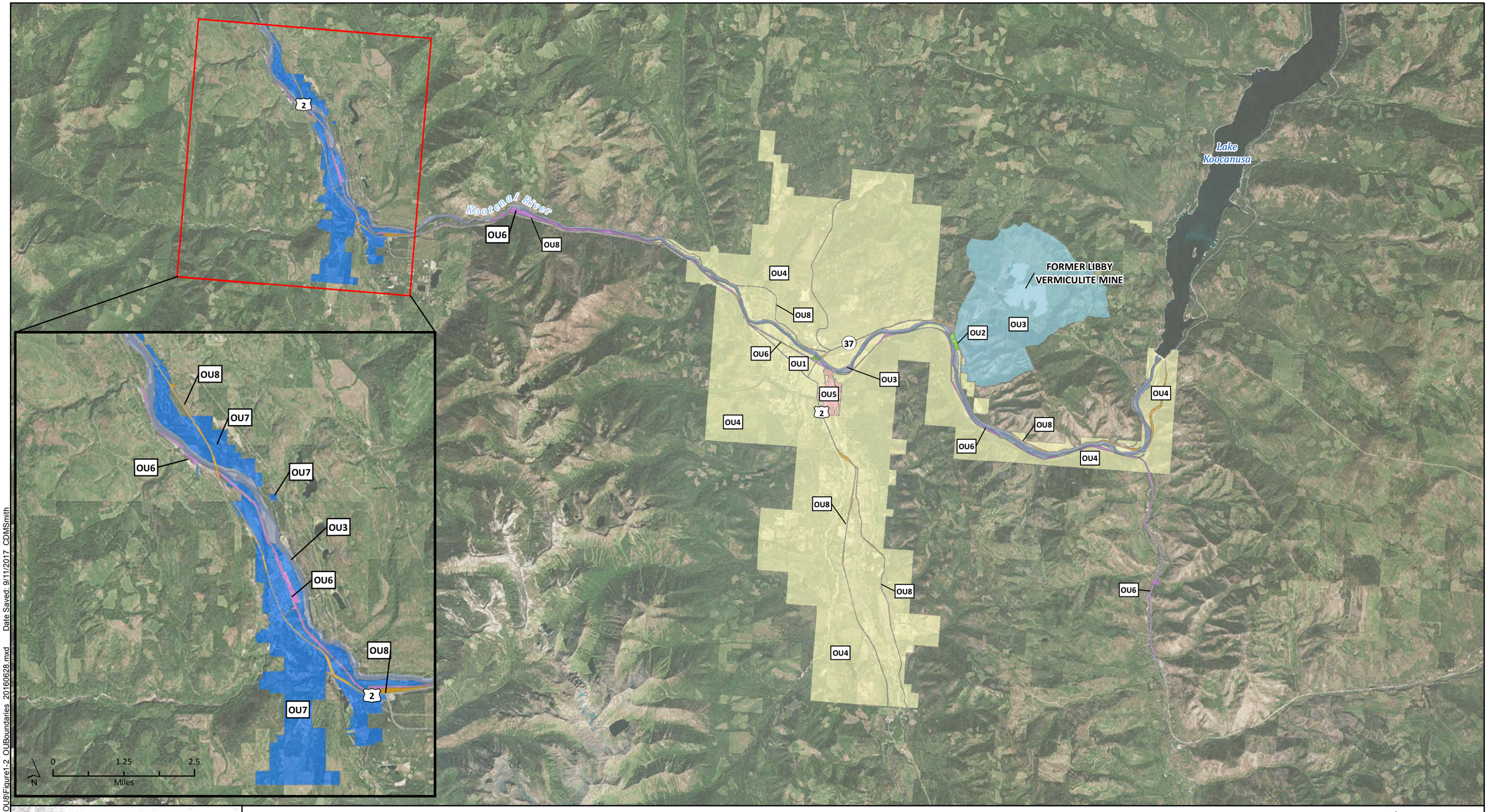

- OU1 - Former Export Plant
- OU2 - Former Screening Plant
- OU 3 Phase 1 (Forest)
- OU 3 Phase 2 (Kootenai River)
- OU4 - Residential/Commercial Areas within Libby
- OU5 - Former Stimson Lumber Mill
- OU6 - Burlington Northern and Santa Fe Railroad
- OU7 - Residential/Commercial Areas within Troy
- OU8 - Highways

Note(s):
1. EPA established the preliminary study area boundary for the purposes of planning and developing the scope of the Remedial Investigation/Feasibility Study (RI/FS) for OU3. This study area boundary may be revised as data are obtained during the RI for OU3 on the nature and extent of environmental contamination associated with releases that may have occurred from the mine site. The final boundary of OU3 will be defined by the final EPA-approved RI/FS.

Aerial Sources: Esri, USGS, NOAA
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Road and Railroad Source: US Census Tiger/Line
Waterways and Waterbodies Source: National Hydrography Dataset - USGS

Figure 1-2

Operable Unit Boundaries
Libby Asbestos Superfund Site | Lincoln County, MT

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Miles

October 2017

CDM Smith

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Map #	Building Description	Location ID
1	Diesel Fire Pump House	BD-002106
2	Electric Pump House	BD-002108
3	Electric Motor Shed	BD-002261
4	Wagner Shed	BD-002260
5	Steel Storage	BD-002111
6	Fire Hall	BD-002112
7	Central Maintenance (multiple removals completed)	BD-002098
8	Truck Barn	BD-002110
9	Main Office	BD-002269
10	Pipe Shop	BD-002263
11	Shed 12	BD-002268
12	Finger Jointer Processing Plant removal completed (September 2010)	BD-002097/ BD-005971
13	Storage and Locomotive Shed	BD-002264
14	Power House and Power House Office	BD-002265/ BD-002266
15	Astrodome	BD-002262 / BD-007602
16	Log Yard Truck Scale House	BD-002104
17	LTU Leachate (Building #2)	BD-005467
18	LTU Leachate (Building #1)	BD-005466
19	Tank Farm Building	BD-005463
20	Bioreactor Building	BD-005555
21	Intermediate Injection Building	BD-005460
22	Office/Laboratory	BD-005556
23	Chemical Storage Building	BD-005465
24	Former Welding Shop - Constructed after Abatement (Lumber Kilns)	BD-002267
26	Former Plywood Plant removal completed (September 2010)	BD-002099
27	Former Popping Plant removal completed (Novemeber 2011)	NA

Surface Soil Results* (2017)

LA in Surface Soil

(Composite)

- ≥1 %
- <1 %
- Trace (<0.2%)
- Non-detect

Qualitative Status

- – No Visible Vermiculite Observed
- \+ Visible Vermiculite Observed

Surface Soil Results* (2007 - 2014)

LA in Surface Soil

(Grab)

- <1 %
- Trace (<0.2%)
- Non-detect

LA in Surface Soil

(Composite)

- ≥1 %
- <1 %
- Trace (<0.2%)
- Non-detect

Qualitative Status

- \+ Visible Vermiculite Observed
- – No Visible Vermiculite Observed

STORMWATER CONTAINMENT AND WASTEWATER LAGOON AREA

RAILROAD SPUR

LUMBER YARD

SOUTHWEST AREA

LOG STORAGE AREA

Existing Class III Landfill

FORMER CHAMPION INTERNATIONAL TREE NURSERY

NOTES:

*Results shown on figure represent post-removal conditions. Surface soil samples were generally collected from the 0-6 inch below ground surface (bgs) interval. Exceptions were made for soil samples collected beneath waste bark test pits (0-12 inches bgs) and samples collected from the rail spur (0-18 inches bgs)

**Results shown were collected from the land farm associated with the Libby Groundwater Superfund Site

Approximate centroid of sample area is shown on this figure and is not intended to represent the lateral extent of the sample area.

Shapefile source: HDR Engineering, Inc. - OU5 Remedial Investigation

Aerial: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- OU 5 Boundary
- Bike Path (Paved as of September 2010)
- Bike Path (Unpaved or Partially Paved)
- MotoX Track
- Surface Water
- Worker ABS Areas
- Soil Removal Action Areas
- Libby Groundwater Superfund Site**
- Approved Waste Bark Disposal Area

Status

- Open Air
- Enclosed Building

Figure 1-3

LA and Visible Vermiculite in Surface Soil at OU5

Libby Asbestos Superfund Site | Lincoln County, MT

OU5 Final Operations and Maintenance Plan

October 2017

N

0 250 500 1,000

Feet

CDM Smith

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Map #	Building Description	Location ID
1	Diesel Fire Pump House	BD-002106
2	Electric Pump House	BD-002108
3	Electric Motor Shed	BD-002261
4	Wagner Shed	BD-002260
5	Steel Storage	BD-002111
6	Fire Hall	BD-002112
7	Central Maintenance (multiple removals completed)	BD-002098
8	Truck Barn	BD-002110
9	Main Office	BD-002269
10	Pipe Shop	BD-002263
11	Shed 12	BD-002268
12	Finger Jointer Processing Plant removal completed (September 2010)	BD-002097/ BD-005971
13	Storage and Locomotive Shed	BD-002264
14	Power House and Power House Office	BD-002265/ BD-002266
15	Astrodome	BD-002262 / BD-007602
16	Log Yard Truck Scale House	BD-002104
17	LTU Leachate (Building #2)	BD-005467
18	LTU Leachate (Building #1)	BD-005466
19	Tank Farm Building	BD-005463
20	Bioreactor Building	BD-005555
21	Intermediate Injection Building	BD-005460
22	Office/Laboratory	BD-005556
23	Chemical Storage Building	BD-005465
24	Former Welding Shop - Constructed after Abatement (Lumber Kilns)	BD-002267
26	Former Plywood Plant (Bldg.footprint) removal completed (September 2010)	BD-002099
27	Former Popping Plant (parking lot) removal completed (November 2011)	NA

STORMWATER CONTAINMENT AND WASTEWATER LAGOON AREA

RAILROAD SPUR

LUMBER YARD

LOG STORAGE AREA

SOUTHWEST AREA

FORMER CHAMPION INTERNATIONAL TREE NURSERY

Existing Class III Landfill

Inset 1

Inset 2

Inset 3

Moderate amounts of vermiculite observed in side wall

High amounts of vermiculite observed in side wall

Moderate amounts of vermiculite observed in side wall

Subsurface Soil Results (>6 inches below ground surface)

LA in Subsurface Soil (Grab)

- <1 %
- Trace (<0.2%)
- Non-Detect

LA in Subsurface Soil (Composite)

- ≥ 1 %
- < 1%
- Trace (<0.2%)
- Non-Detect

Qualitative Status

- \+ Visible Vermiculite Observed
- – No Visible Vermiculite Observed

NOTES:

*Results shown on figure in removal action areas represent the condition at the floor of the excavation. Samples represent post-removal conditions.

**Approximate locations shown based on observations during removal actions. Actual location of visible vermiculite may vary. These represent visual observation of vermiculite - samples are not collected from side walls.

***Results shown were collected from the land farm associated with the Libby Groundwater Superfund Site Geographic Removal Zone (GRZ).

Approximate centroid of sample area is shown on this figure and is not intended to represent the lateral extent of the sample area.

OU5 Remedial Investigation Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- OU 5 Boundary
- Bike Path (Paved as of September 2010)
- Bike Path (Unpaved or Partially Paved)
- MotoX Track
- Surface Water
- Worker ABS Areas
- Soil Removal Action Areas*
- Vermiculite observed in side walls of excavation**
- Libby Groundwater Superfund Site***
- Approved Waste Bark Disposal Area

Building Status

- Open Air
- Enclosed Building/Previous Building Footprint
- Inset Extents (See Figure 2-2A)

N

Feet

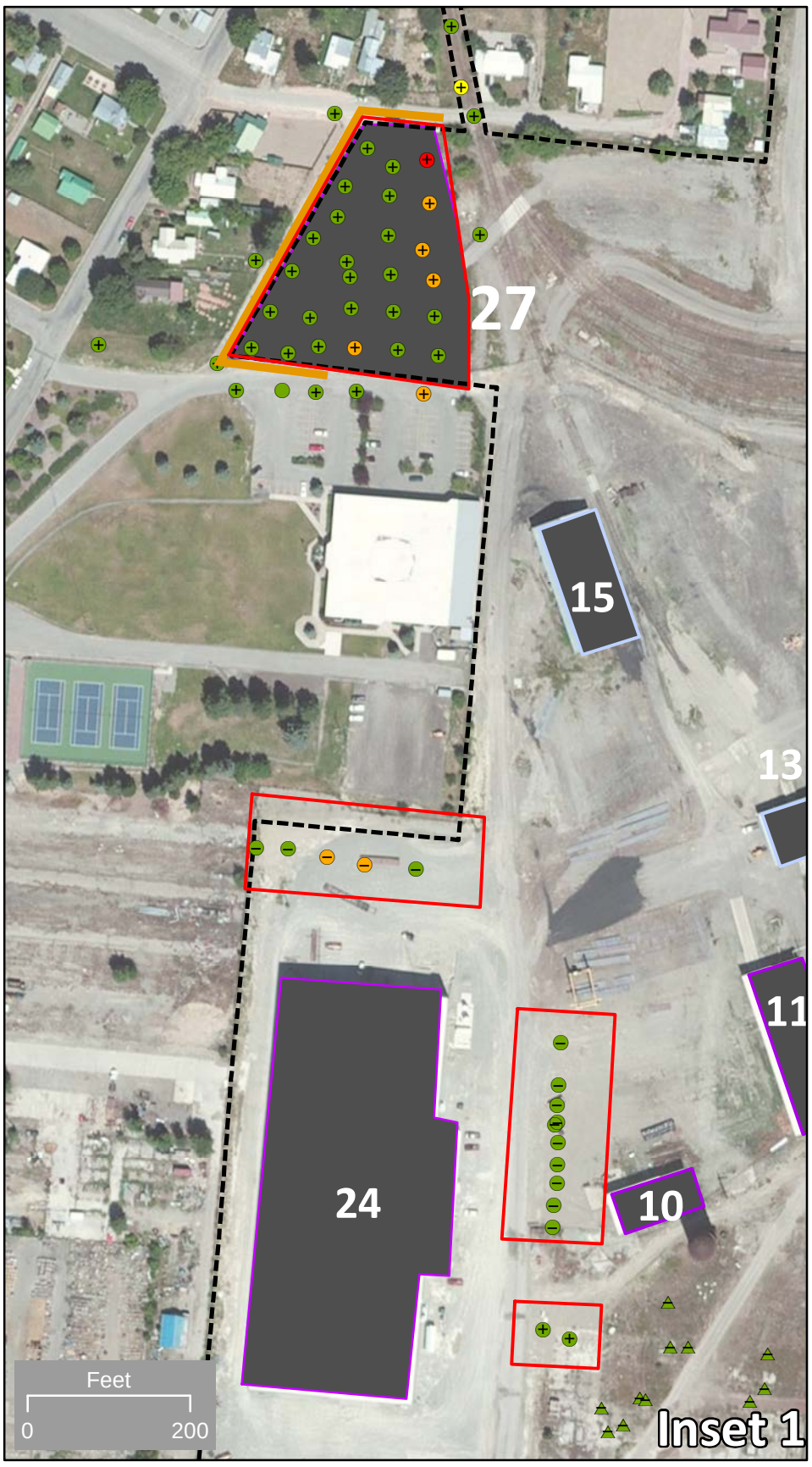
0 250 500 1,000 1,500

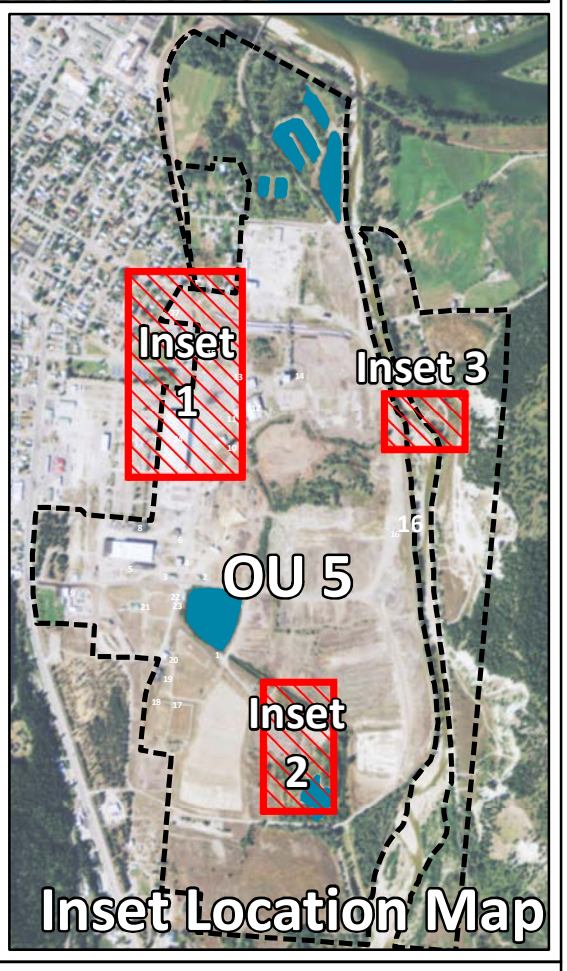
Figure 1-4a

LA and Visible Vermiculite in Subsurface Soil at OU5
Libby Asbestos Superfund Site | Lincoln County, MT

OU5 Final Operations and Maintenance Plan
October 2017

CDM Smith





NOTES:
*Results shown on figure in removal action areas represent the condition at the floor of the excavation. Samples represent post-removal conditions.
**Approximate locations shown based on observations during removal actions. Actual location of visible vermiculite may vary.
***Results shown were collected from the land farm associated with the Libby Groundwater Superfund Site Geographic Removal Zone (GRZ).
Approximate centroid of sample area is shown on this figure and is not intended to represent the lateral extent of the sample area.

GRZ Shapefile source: HDR Engineering, Inc.

OU5 Remedial Investigation Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 1-4b

LA and Visible Vermiculite in Subsurface Soil at OU5 Insets

Libby Asbestos Superfund Site | Lincoln County, MT

OU5 Final Operations and Maintenance Plan

October 2017

See Figure 1-4a Legend for Symbol Definitions

N

CDM Smith

Appendix A

Example Land Use Review Form

Evaluation of
Libby Asbestos Superfund Site; Operable Unit 5; Kootenai Business Park

Purpose of Document:
It is anticipated that the Lincoln County Port Authority (LCPA) will continue to enhance and/or further develop areas of the property. This report serves to document development to establish the level of assessment required to meet the terms of the ROD and IC Plan for the Libby Asbestos Superfund Site. Any new development will require that the Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (DEQ) be notified and may require additional sampling to ensure soil exposure scenarios align with their intended use.

Project Location:

Description of Proposed Land Development:

Anticipated Schedule:

Current Characterization of Site: (to be completed by LCARP)

Current Evaluation:
- ☐ Industrial
- ☐ Commercial
- ☐ Recreational
- ☐ Not Evaluated

Proposed Use:
- ☐ Industrial
- ☐ Commercial
- ☐ Recreational

Existing Analytical Data and Sources: (to be completed by LCARP)

Recommendations and Investigation Needed: (to be completed by LCARP)

The Lincoln County Port Authority and its designees are responsible for adhering to all institutional controls set forth on their property located at OU5 and shall refer to the OU5 ICIAP for guidance on best management practices during all phases of future work on their property.

References
EPA. 2016. Final Remedial Action Report, Operable Unit 5 – Former Stimson Lumber Mill, Libby Asbestos Superfund Site, Lincoln County, Montana. September 28.

Acknowledgements:

_____ _____
Lincoln County Port Authority Representative Date

_____ _____
Lincoln County Asbestos Resource Program Date

Above signature only acknowledges receipt of form, review by ARP staff, and recommendation provided. Signature does not represent authorization/approval to conduct the above referenced work. Property owner is responsible to meet all local, State, and Federal requirements/regulations associated with the above referenced work.

Appendix B

MDT Encroachment Permit Application and Addendum

STATE OF MONTANA - DEPARTMENT OF TRANSPORTATION
HELENA, MT 59620-1001
ENCROACHMENT APPLICATION AND PERMIT

– To be filled in by Department of Transportation Personnel –

AGREEMENT NO.: _____ **MAINTENANCE NO.:** _____

PROJECT NO.: _____ **SIGN ROUTE:** _____

PROJECT NAME: _____ **ID NUMBER:** _____

CORRIDOR: _____ **RB:** _____ **MP:** _____

COUNTY: _____

– To be filled in by Department of Transportation Personnel and the requesting Company –

_____	_____	_____	_____
COMPANY OR CORPORATION	**Date**	**MONTANA DEPARTMENT OF TRANSPORTATION**	**Date**
_____		_____	
TITLE		**TITLE**	
_____		_____	
SIGNATURE		**SIGNATURE**	

Subject to the terms and conditions shown on Page 2 hereof; this permit is hereby approved and granted.

The "Permittee" agrees to the terms of this permit.

APPLICANT (PROPERTY OWNER)

APPLICATION FOR PERMISSION TO: _____*_____
(Give sufficient detail to permit thorough understanding and submit blueprints or sketches in triplicate.)
***If work involves Environmental-Related cleanup or monitoring, also complete Section 7.**

Township	Range	Section
_____	_____	_____

1. Name of Applicant: _____
2. Address of Applicant: _____
3. Applicant's Phone #: _____ Fax #: _____ Email: _____
4. If Applicant is a Corporation, give State of Incorporation and names of President and Secretary:
   _____
5. Highway survey stations, milepost, distances to centerline, and distance from right-of-way line (in metric units) near which installations or structures will be installed:
   _____
6. For how long a period is the permit desired?: _____
7. Nature of Permit: _____
8. Environmental actions involving hazardous waste sites? (Superfund, Spills, Underground Storage Tanks, Old Mines, etc.)

   YES: ☐ If YES is checked continue to **Page 3** to complete the **Environmental Questions Pertaining to #8 on Page #1.**

   NO: ☐ If No is checked continue to **Page 2**, **Instructions Concerning Use of this Form**.

(INSTRUCTIONS
CONCERNING USE OF THIS FORM)

Applicant will complete this form along with plans, sketches and an environmental checklist and send to the appropriate District Maintenance Chief for review and approval.

AN ENVIRONMENTAL CHECKLIST MUST BE COMPLETED BY APPLICANT AND MUST BE ATTACHED TO THIS PERMIT. THE PERMIT MUST NOT BE PROCESSED WITHOUT AN ENVIRONMENTAL CHECKLIST.

IF THE PROPOSED INSTALLATION WILL RESULT IN SIGNIFICANT, PERMANENT OR LONG TERM IMPACTS TO THE TRANSPORTATION NETWORK IN TERMS OF SUBSTANTIAL INCREASE TRAFFIC VOLUMES, WEIGHT OR DELAYS TO TRAFFIC ON STATE ROADWAYS, SUCH AS MAJOR MINES GREATER THAN FIVE ACRES, A RAILROAD AT–GRADE CROSSING, RAILROAD UNDER OR OVERPASS, OR STRIP MINES, OR IF THE PROPOSED ACTION HAS PERMANENT IMPACTS TO OTHER FORMS OF TRANSPORTATION (RAIL, TRANSIT, OR AIR MOVEMENT), THE ENCROACHMENT PERMIT MUST BE SUBMITTED TO THE TRANSPORTATION PLANNING DIVISION FOR REVIEW PRIOR TO ISSUANCE OF THIS PERMIT.

Subject to the following terms and conditions, the permit applied for upon the reverse side hereof, is hereby granted:

1. TERM. This permit shall be in full force and effect from the date hereof until revoked as herein provided.

2. FEE. The fee for issuance of this permit is ._____.

3. REVOCATION. This permit may be revoked by State upon giving **45** days notice to Permittee by ordinary mail, sent to the address shown herein. However, the State may revoke this permit without notice if Permittee violates any of its conditions or terms.

4. COMMENCEMENT OF WORK. No work shall be commenced until Permittee notifies the Maintenance Chief shown in application the date the Permittee proposes to commence work.

5. CHANGES IN HIGHWAY. If State highway changes necessitate changes in structures or installations installed under this permit, Permittee will make necessary changes without expense to State.

6. STATE SAVED HARMLESS FROM CLAIMS. As a consideration of being issued this permit, the Permittee, its successors or assigns, agrees to protect the State and save it harmless from all claims, actions or damage of every kind and description which may accrue to, or be suffered by, any person or persons, corporations or property by reason of the performance of any such work, character of materials used, or manner of installations, maintenance and operation, or by the improper occupancy of said highway right-of-way, and in case any suit or action is brought against the State and arising out of, or by reason of, any of the above causes, the Permittee, its successors or assigns, will, upon notice to them of the commencement of such action, defend the same at its sole cost and expense and satisfy any judgment which may be rendered against the State in any such suit or action.

7. PROTECTION OF TRAFFIC. The Permittee shall protect the work area with traffic control devices that comply with the Manual of Uniform Traffic Control Devices. The Permittee may be required to submit a traffic control plan to the Maintenance Chief for approval prior to starting work. During work, the Maintenance Chief or designee may require the Permittee to use additional traffic control devices to protect traffic or the work area. No road closure shall occur without prior approval from the District Engineer.

8. HIGHWAY AND DRAINAGE. If the work done under this permit interferes in any way with the drainage of the State highway affected. Permittee shall, at the Permittee's expense, make such provisions as the State may direct to remedy the interference.

9. RUBBISH AND DEBRIS. Upon completion of work contemplated under this permit, all rubbish and debris shall be immediately removed and the roadway and roadside left in a neat and presentable condition satisfactory to the State.

10. INSPECTION. The installation authorized by this permit shall be in compliance with the attached plan and the conditions of this permit. The Permittee may be required to remove or revise the installation, at sole expense of Permittee. If the installation does not conform with the requirements of this permit or the attached plan.

11. STATE'S RIGHT NOT TO BE INTERFERED WITH. All changes, reconstruction or relocation shall be done by Permittee so as to cause the least interference with any of the State's work, and the State shall not be liable for any damage to the Permittee by reason of any such work by the State, its agents, contractors or representatives, or by the exercise of any rights by the State upon the highways by the installations or structures placed under this permit.

12. REMOVAL OF INSTALLATIONS OR STRUCTURES. Unless waived by the State, upon termination of this permit, the Permittee shall remove the installations or structures installed under this permit at no cost to the State and restore the premises to the prior existing condition, reasonable and ordinary wear and tear and damage by the elements, or by circumstances over which the Permittee has no control, excepted.

13. MAINTENANCE AT EXPENSE OF PERMITTEE. Permittee shall maintain, at its sole expense, the installations and structures for which this permit is granted, in a condition satisfactory to the State.

14. STATE NOT LIABLE FOR DAMAGE TO INSTALLATIONS. In accepting this permit, the Permittee agrees that any damage or injury done to said installations or structures by a contractor working for the State, or by any State employee engaged in construction, alteration, repair, maintenance or improvement of the State highway, shall be at the sole expense of the Permittee.

15. STATE TO BE REIMBURSED FOR REPAIRING ROADWAY. Upon being billed, therefore, Permittee agrees to promptly reimburse State for any expense incurred in repairing surface of roadway due to settlement at installation, or for any other damage to roadway as a result of the work performed under this permit.

16. The Permittee shall not discharge or cause discharge of any hazardous or solid waste by the installation or operation of the facility of a State Right-of-Way.

17. The Permittee will control noxious weeds within the disturbed installation area for two (2) years.

18. In accordance with Mont. Code Ann. § 76-3-403(2), Permittee shall, at Permittee's expense, employ the services of a Montana Licensed Professional Land Surveyor to re-establish all existing survey monuments disturbed by work contemplated under this permit.

19. The use of explosives is prohibited for the installation.

20. Any condition of this permit shall not be waived without written approval of the appropriate District Engineer.

21. OTHER CONDITIONS AND/OR REMARKS: _____

Environmental Questions Pertaining to #8 on Page #1- Environmental actions involving hazardous waste sites? (Superfund, Spills, Underground Storage Tanks, Old Mines, etc.)

8a. Name of Facility:_____ Facility ID:_____

Address: _____

City: _____State:_____Zip: _____

8b. Leaking underground storage tank site? ☐ Yes ☐ No

If yes, provide MDEQ identification number: _____

Petro Fund Eligible? ☐ Yes ☐ No

8c. Remediation Response Sites (State Superfund Site)? ☐ Yes ☐ No

If yes, identification number and/or site name: _____

8d. Federal Superfund Site? ☐ Yes ☐ No

If yes, identification number and/or site name: _____

8e. Active Mine: ☐ Yes ☐ No **OR** Abandoned Mine: ☐ Yes ☐ No

If yes, list the Mine Site ID#: _____

Mine Description or Name: _____

8f. Spill: ☐ Yes ☐ No

Spill Site: _____

Spill Description: _____

8g. Other Environmental Action: _____

For each well installed in MDT R/W, provide GPS coordinates in state plane coordinates (preferred) or well survey information in another format (continue on another sheet if necessary).

NOTE: Each well request needs to be submitted on a separate application form.

Well Designation	**Easting**	**Northing**

Control Number	Project Identification Number	Name/ Location Description	Route/Corr.	Fed Funds Involved? Yes ☐ No ☐

(↑For MDT Use Only↑)

ENVIRONMENTAL CHECKLIST for:

☐ **Approach Permit** ☐ **Encroachment/Occupancy (incl. Utility)**

☐ **Maintenance Projects (with No Right-Of-Way Acquisition, Sale or Transfer)**

Location: Highway or Route: _____ Milepost(s): _____

Physical Address: _____ City: _____

Legal Description: County: _____ Township: _____ Range: _____ Section(s):

Applicant Information: Name: _____ Phone: _____

Company/Utility _____ Business Phone: _____

Mailing Address: _____ City _____ State _____ Zip Code _____

	Impact Questions Actions that qualify for Categorical Exclusion under MEPA and/or NEPA (See ARM 18.2.261 and 23 CFR 771.117)	**Yes**	**No**	**Comment, Explanation, and/or Informat Source (Attach supporting information, necessary.)**
1.	Will the proposed action impact any known historical or archaeological site(s)?	☐	☐	
2.	Will the proposed action impact any publicly owned parkland(s), recreation area(s), wildlife or waterfowl refuge(s)?	☐	☐	
3.	Will the proposed action impact prime farmlands? (If yes, attach a completed Farmland Conversion Impact Rating Ad-1006.)	☐	☐	
4.	a. Will the proposed action have an impact on the human environment that may result from relocations of persons or businesses, changes in traffic patterns, changes in grade, or other types of changes?	☐	☐	
	b. Has the proposed action received any preliminary or final approval from the local land use authority?	☐	☐	
5.	For the proposed action, is there documented controversy on environmental grounds? (For example, has the applicant received a letter of petition from an environmental organization?)	☐	☐	
6.	Will the proposed action require work in, across or adjacent to a listed or proposed Wild or Scenic River?	☐	☐	
7.	Will the proposed action require work in a Class I Air Shed or nonattainment area?	☐	☐	
8.	Will the proposed action impact air quality or increase noise, even temporarily?	☐	☐	
9.	Will the proposed action have potential to affect water quality, wetlands, streams or other water bodies? If the answer is YES, an environment-related permit or authorization may be required.	☐	☐	
10.	Are solid or hazardous wastes or petroleum products likely to be encountered? (For example, project occurs in or adjacent to Superfund sites, known spill areas, underground storage tanks, or abandoned mines.)	☐	☐	
11.	a. Are there any listed or candidate threatened or endangered species, or critical habitat in the vicinity of the proposed action?	☐	☐	
	b. Will the proposed action adversely affect listed or candidate threatened or endangered species, or adversely modify critical habitat?	☐	☐	
12.	Will the proposed action require an environmental-related permit or authorization? If the answer is "yes," please list the specific permits or authorizations.	☐	☐	
13.	a. Is the proposed action on or within approximately 1 mile of an Indian Reservation?	☐	☐	
	b. If "Yes", will a Tribal Water Permit be required	☐	☐	N/A ☐
14.	Will the proposed action result in increased traffic volumes, increased wait or delays on state highways, or have adverse impacts on other forms of transportation (rail, transit or air movements)?	☐	☐	
15.	Is the proposed action part of a project that may require other governmental permits, licenses or easements? If "Yes", describe the full extent of the project and any other permits, licenses or easements that may be necessary for the applicant to acquire.	☐	☐	

16. ☐ Attach a brief description of the work to be performed, including any subsurface work.

17. ☐ Attach representative photos of the site(s) where the proposed action would be implemented. Photos are to include any structures, streams, irrigation canals, and/or potential wetlands in the project area.

18. ☐ Attach map(s) showing the location(s) of the proposed action(s); Section, Township, Range; highway or route number and approximate route post(s).

Checklist preparer: _____

Applicant Title Date

Reviewed for completeness by:

MDT District Representative	Title	Date

Checklist Approved by:

Environmental Services Bureau (When any of the items 1 through 15 are checked "Yes")	Title	Date
Transportation Planning (When items 14 or 15 are checked "Yes")	Title	Date

Checklist Conditions and Required Approvals

A. The Applicant is **not** authorized to proceed with the proposed work until the checklist has been reviewed and approved, as necessary, and any requested conditions of approval have been incorporated.

B. Complete the checklist items 1 through 15, indicating "Yes" or "No" for each item. Include comments, explanations, information sources, and a description of the magnitude/importance of potential impacts in the right hand column. Attach additional and supporting information as needed. Ensure that information required for items 16, 17, and 18, is attached. The checklist preparer, by signing, certifies the accuracy of the information provided.

C. If "Yes" is indicated on any of the items, the Applicant must explain the impacts as applicable. Appropriate mitigation measures that will be taken to avoid, minimize, and/or mitigate adverse impacts must also be described. **Any proposed mitigation measures will become a condition of approval.** Use attachments if necessary. If the applicant checks "No" and the District concludes there may in fact be potential impacts, the Environmental Checklist must be forwarded to Environmental Services Bureau for review and approval.

D. If "Yes" is indicated in item 11 a. (threatened or endangered species), the Applicant should provide information naming the particular species and the expected location, distribution and habitat use in the proposed action area, i.e. within the immediate area of the proposed action; or, in the general area on occasion (seasonally passes through) but does not nest, den or occupy the area for more than a few days.

E. If the applicant checks "Yes" for any item, the approach permit, occupancy agreement or permit, along with the checklist and supporting information, including the Applicant's mitigation proposal, documentation, evaluation and/or permits must be submitted to MDT Environmental Services Bureau. Electronic format is preferred.

F. When the applicant checks "Yes" to any item, the Applicant cannot be authorized to proceed with the proposed work until the MDT Environmental Services Bureau and/or Transportation Planning, as appropriate, reviews the information and signs the checklist.

G. Applicant must obtain all necessary permits or authorizations from other entities with jurisdiction prior to beginning the proposed action or activity. The Applicant is solely responsible for any environmental impacts incurred as a result of the project; obtaining any necessary environmental permits, notifications, and/or clearances; and ensuring compliance with environmental laws and regulations.

Montana's Wild and Scenic Rivers system as published by the U.S. Department of Agriculture, or the U.S. Department of the Interior:

1. Middle Fork of the Flathead River (headwaters to South Fork of the Flathead River confluence)
2. North Fork of the Flathead River (Canadian Border to Middle Fork of the Flathead River confluence)
3. South Fork of the Flathead River (headwaters to Hungry Horse Reservoir)
4. Missouri River (Fort Benton to Charles M. Russell National Wildlife Refuge)

Stream Permitting Guidelines

To be used for informational purposes when filling out the Environmental Checklist for MDT approach permits, encroachment/occupancy permits or Maintenance projects.

The most commonly required permits or authorizations are listed below. **Other permits or authorizations may be required**, and other laws may apply depending on the type and the location of the proposed activity. For more information please refer to "A Guide to Stream Permitting in Montana" available on the Internet at http://www.dnrc.mt.gov/permits/ or from your local conservation district office. (The information provided below was adapted from "A Guide to Stream Permitting in Montana")

Montana Natural Streambed and Land Preservation Act (310 Permit)

Any private, nongovernmental individual or entity that proposes any activity that physically alters or modifies the bed or banks of a **perennially flowing stream** must obtain a 310 permit before beginning work.

Contact the conservation district office to obtain a permit application, fill the application out and submit it to the local conservation district prior to any activity in or near a perennial-flowing stream. Once an application is accepted, a team that consists of a conservation district representative; a Department of Fish, Wildlife and Parks biologist; and the applicant may conduct an on site inspection. The team makes recommendations to the conservation district board, which has 60 days from the time the application is accepted to approve, modify, or deny the permit. Local rules apply. There is no charge for a 310 permit.

For more information, contact your local conservation district or the Conservation Districts Bureau – MT Department of Natural Resources and Conservation at (406) 444-6667, or the Montana Association of Conservation Districts (406) 443-5711

Montana Stream Protection Act (SPA 124 Permit)

Any agency or subdivision of federal, state, county, or city government proposing a project that may affect the natural existing shape and form of **any stream** or its banks or tributaries must obtain a SPA 124 permit before beginning work.

Any agency or unit of government planning a project must submit a Notice of Construction (application) to the Department of Fish, Wildlife and Parks, which has up to 60 days to review the application, perform an on-site investigation, and approve, modify, or deny the application. There is no application fee.

For more information contact the Habitat Protection Bureau – MT Fish, Wildlife and Parks (406) 444-2449.

Montana Floodplain and Floodway Management Act (Floodplain Development Permit)

Anyone planning new construction **within a designated l00 year floodplain** must obtain a floodplain development permit before beginning work. New construction includes, but is not limited to, placement of fill, roads, bridges, culverts, transmission lines, irrigation facilities, storage of equipment or materials, and excavation; new construction, placement, or replacement of manufactured homes; and new construction, additions, or substantial improvements to residential and commercial buildings. Check with local planning officials or the Floodplain Management Section of the Department of Natural Resources and Conservation to determine whether a 100-year floodplain has been designated for the stream of interest.

Floodplain Development Permits are available from the local floodplain administrator, who may be the city/county planner, sanitarian, building inspector, town clerk, or county commissioner.
Permit applications are available from the local floodplain administrator or from the Department of Natural Resources and Conservation. Application fees are established by the local government and vary widely throughout the state. The application process may take up to 60 days. Joint application participant-see Permitting Tips section.

For more information contact the Floodplain Management Section – MT Department of Natural Resources and Conservation (406) 444-0860.

Federal Clean Water Act (404 Authorization or Permit)

Anyone proposing a project that will result in the **discharge or placement of dredged or fill material into waters of the United States** must obtain a 404 authorization or permit before beginning work. "Waters of the United States" include lakes, rivers, streams (including perennial, intermittent, and ephemeral channels with an ordinary high water mark), wetlands, and other aquatic sites.

Anyone planning a project must submit an application to the U.S. Army Corps of Engineers (Corps). The U.S. Environmental Protection Agency also has regulatory review and enforcement functions under the law. Permit authorization varies depending on the size and scope of the intended project.

Activities that meet the conditions for a Nationwide or Regional General Permit may be approved in 10 to 45 days. Individual Permits require more extensive review and require a public notice period. Permit approval may take 90 to 120 days. Application fees for Individual Permits may vary from $10 for private individuals to $100 for commercial applicants. Do not send money with the application. Applicants will be notified if a fee applies.

For more information contact the U.S. Army Corps of Engineers, 10 West 15th Street, Suite 2200, Helena, MT 59626, Phone (406) 441-1375.

Short-term Water Quality Standard for Turbidity (318 Authorization)

Anyone initiating construction activity that will cause **short term or temporary violations of state surface water quality standards for turbidity in any "State water"** must obtain a 318 Authorization before beginning work. "State water" includes any body of water, irrigation system, or drainage system, either surface or underground, including wetlands, except for irrigation water where the water is used up within the irrigation system and the water is not returned to other state water.

A 318 Authorization must be obtained prior to initiating a project. The authorization may be obtained from the Department of Environmental Quality, or may be waived by the Department of Fish, Wildlife and Parks during its review process under the Natural Streambed and Land Preservation Act (310 Permit) or the Stream Protection Act (SPA 124 Permit).

Individual applications submitted to the Department of Environmental Quality are normally processed within 30 to 60 days. Authorizations waived under the 310 or SPA 124 permit processes correspond to the time frame under each permit system, usually 30 to 60 days. There is an application fee of $150.00 (make check or money order payable to Water Protection Bureau, Department of Environmental Quality).

For more information contact the Water Protection Bureau – MT Department of Environmental Quality (406) 444-3080.

Storm Water Discharge General Permits

Anyone proposing a construction **activity that will disturb one or more acres**, a defined industrial activity; a mining or oil and gas activity in which storm water will come into contact with overburden, raw material, intermediate products, finished products, or waste products located on the site of such operations (including active and inactive mine sites); or other defined activity that **has a discharge of storm water into surface waters**. Permit authorization is typically obtained under a Montana Pollutant Discharge Elimination System (MPDES) "General Permit".

For storm water discharges associated with construction activity, permit authorization is effective upon Department receipt of a complete Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and fee. This must be received no later than the construction activity start date. For other regulated storm water discharges, a complete Application Form, SWPPP (except for Small MS4s), and fee must be received for review at least 30 days prior to the discharge of storm water from the facility or activity. Fees vary depending on the type of permit. Contact the Department or visit the website listed below for various storm water discharge "General Permits," Application/NOI Forms, fee schedule, and other permitting forms/information.

For more information contact the Water Protection Bureau – MT Department of Environmental Quality, (406) 444-3080, http://www.deq.mt.gov.

ADDENDUM TO MDT APPROACH AND ENCROACHMENT/OCCUPANCY PERMIT
NOTIFICATION OF LIBBY AMPHIBOLE ASBESTOS

MDT right-of-way surface soil located within the boundaries of the Libby Asbestos National Priorities List Superfund site and in yet unidentified areas of MDT right-of-way in Lincoln Co., Montana may contain ubiquitous amounts of amphibole asbestos contamination. This contamination is sourced from the historic mining, processing, and transport of vermiculite from the former W.R. Grace Mine located north of Libby, MT. The releases of Libby amphibole asbestos (LA) to the environment have caused a range of adverse health effects in exposed people, including not only workers at the mine and processing facilities, but also residents of Lincoln County.

Testing by MDT and the U.S. Environmental Protection Agency (EPA) has confirmed the presence of LA in both asphalt aggregate and in MDT right-of way surface soil on MT 37 north of the Kootenai River Bridge to past the junction with Rainy Creek Road. Though not yet tested, LA may also be present in trees and vegetation. Testing also indicates that other transportation corridors in Lincoln Co. also contain varying amounts of LA in both surface soil and vegetation.

(Name of Permittee) is hereby put on notice that undiscovered areas of LA contamination may be present in MDT right-of-way surface soil in the permit area. Permittee should take all appropriate precautions to guard against potential exposure to LA contamination by its agents, employees, or other third parties while conducting any soil or vegetation disturbance in MDT right-of-way in the permit area. Permittee shall notify the EPA to report any planned disturbance of soil or vegetation within the permit area, at (406) 291-5335. For additional information or questions, Permittee may contact the EPA or MDT Environmental Services in Helena, MT at (406) 444-7632.

Permittee, its agents and employees, agree to protect, defend and indemnify the State of Montana, MDT, its agents, and employees, and save and hold each of them harmless from and against all claims, demands and causes of action of any kind or character, including defense costs, arising from activities conducted under this permit, from any claims or causes of action from the Permittee's agents, employees, or other third parties arising from or allegedly due to activities under this permit, and from any claims, demands and causes of action of any kind or character, including defense costs, or damages due to or allegedly caused to any third parties for personal injuries, property damage, loss of life or property, civil penalties, or criminal fines resulting from or in any way connected with activities pertaining to this permit.

This Addendum constitutes an addition to said permit. All other provisions of said permit remain unchanged.

Appendix C

Recommended Annual O&M Checklist

RECOMMENDED ANNUAL O&M /REMEDY EVALUATION CHECKLIST

Introduction and Purpose

Effective operation and maintenance (O&M) at Superfund sites generally is critical to ensure that remedies remain protective of human health and the environment.

The recommended Annual O&M Remedy Evaluation Checklist has been designed to help the Remedial Project Manager (RPM) capture data routinely collected during O&M in a way that can better evaluate the efficiency and effectiveness of the remedial action. This recommended checklist may also be used to evaluate an operating remedy prior to transferring the site to the State for O&M. In addition, remedy performance summarized using this recommended checklist can be used to communicate remedy progress to the local community, highlight potential issues before they become problems and help the RPM complete five-year reviews more efficiently.

The information that you collect using this recommended form should help you answer the following questions:

- Is the remedy achieving the remedial action objectives (RAOs), maintaining cleanup goals and/or achieving technology-specific performance goals?
- If the remedy is not achieving the established objectives and goals, what must I do to correct this and how can I document this?
- If the remedy is achieving the performance goals, objectives and performance standards, are there any opportunities to optimize the remedy to make it work more efficiently?

This recommended checklist is intended to be completed annually. It is recommended that any data that you use to complete this evaluation be attached to the checklist, as this will make completing the next year's evaluation easier.

This recommended checklist does not recommend the level of review carried out in the U.S. Environmental Protection Agency (EPA) five-year review process. However the recommended checklist contains review elements that are consistent with a five-year review process.

Instructions:

The recommended checklist is in Microsoft Word and was designed to be completed electronically. Most questions involve a short answer, yes/no response or simply checking the box. Questions that involve a short answer will have an expandable text box. For responses that ask to you to "select one," please double click on "select one" and choose the correct answer. If the information is not available for a particular question, please indicate this with a N/A. A site visit is strongly encouraged, but not required prior to completing the recommended checklist.

1. This evaluation is intended to be completed yearly once O&M activities have begun at a site and can be stored and maintained in an electronic format.
2. For large complex sites, consider completing a separate checklist for each Operable Unit (OU).
3. This evaluation should be based on information and documentation (e.g., O&M reports and monitoring data) that is readily available to the RPM.
4. Section VIII, "Technical Data and Remedy Performance," provides specific instructions regarding what data and information are important for this section. Data entered in Section VIII are used to evaluate the specific technology used in that remedial action (RA). Please note: *Section VIII, Appendix E, Other Remedy Types/Components* was designed to be used by the RPM for the annual review of O&M remedies and remedy components that are not addressed in Appendices A through D or by the separate *Recommended Annual O&M Remedy Evaluation Checklist for Contaminated Sediment Remedies*, OSWER #9355.0-118.
5. When you have completed the recommended checklist, please sign and date page 1 and place the completed document in the site file. Additionally, we recommend that you save the completed checklist electronically for use in completing the next year's evaluation.

Generally, including the Recommended Annual O&M/Remedy Evaluation Checklist in the site repository can provide the community with information about O&M status and remedy performance and can demonstrate that the Region is tracking performance to ensure that the remedy remains protective.

Acronym List			
AS	Air Sparging	PCOR	Preliminary Close Out Report
CSM	Conceptual Site Model	PRGs	Preliminary Remediation Goals
GAC	Granular Activated Carbon	PRP	Potentially Responsible Party
ICs	Institutional Controls	RAO	Remedial Action Objective
LEL	Lower Explosive Limit	ROD	Record of Decision
LTRA	Long-Term Response Action	RPM	Remedial Project Manager
MNA	Monitored Natural Attenuation	RSE	Remediation System Evaluation
NPL	National Priorities List	SVE	Soil Vapor Extraction
O&F	Operational and Functional	TI Waivers	Technical Impracticability Waivers
O&M	Operation and Maintenance	USACE	U.S. Army Corps of Engineers
OSHA	Occupational Safety and Health Administration	VEB	Vertical Engineered Barrier
OU	Operable Unit	VOCs	Volatile Organic Compounds

RECOMMENDED ANNUAL O&M /REMEDY EVALUATION CHECKLIST

Please save electronically and send this completed checklist and any attachments to the site file and site repository.

I. SIGNATURES AND APPROVALS					
RPM			**RPM (If appropriate)**		
Name:			Name:		
Telephone:			Telephone:		
Signature:		Date:	Signature:		Date:
State Contact (if appropriate)					
Name:					
Telephone:					
Signature:					Date:

II. GENERAL SITE INFORMATION			
Site Name:			
State:			
Period Covered:	to		EPA Site ID:
Site Lead:	(Select one)	Other, specify:	
Organization responsible for O&M operations:		(Select one)	
Other, specify:			
Site Remedy Components (ref. Section VIII):			
Preliminary Close Out Report (PCOR) date:			
Operational & Functional (O&F) date:			
Last five-year review date:			
NPL deletion date:			
Did you make a site visit during this review?	☐ Yes ☐ No		Date:
If no, why:			
Date of next planned checklist evaluation:			
Location of Administrative Record/Site Files:			
During the site visit, was monitoring equipment operational?			☐ Yes ☐ No ☐ N/A
Please elaborate:			
Has an Optimization Study been conducted at the site?	☐ N/A ☐ Yes ☐ No		Date:
If not, is one planned?			

List all site events since the last evaluation that impact or may impact remedy performance.
Chronology of events since last report (e.g., site visits, receipt of reports, equipment failures, shutdowns, vandalism, storm events):
Elaborate on significant site events or visits to site:

III. DOCUMENTS AND RECORDS Because these documents may be required for the five-year review, verify what documents are currently available on-site, or note off-site location:				
Document	**Required**	**Not required**	**On-site**	**Off-site (indicate where)**
O&M Manual	☐	☐	☐	☐
O&M Maintenance Logs	☐	☐	☐	☐
O&M Annual Reports	☐	☐	☐	☐
RA as-built drawings modified during O&M	☐	☐	☐	☐
Site-Specific Health and Safety Plan	☐	☐	☐	☐
Contingency/Emergency Response Plan	☐	☐	☐	☐
O&M/Occupational Safety and Health Administration (OSHA) Training Records	☐	☐	☐	☐
Settlement Monument Records	☐	☐	☐	☐
Gas Generation Records	☐	☐	☐	☐
Ground Water Monitoring Records	☐	☐	☐	☐
Surface Water/Sediment/Fish Monitoring Records**	☐	☐	☐	☐
Cap/Cover System Inspection Records	☐	☐	☐	☐
Leachate Extraction Records	☐	☐	☐	☐
Discharge Compliance Records	☐	☐	☐	☐
Institutional Controls (ICs) Review	☐	☐	☐	☐
Other(s) (Please name each)	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

** Note: A separate O&M checklist has been developed for surface water/sediment remedies. For completeness, answer this question regarding documentation requirements and availability, and enter more detailed information in the surface water/sediment checklist.

IV. ADMINISTRATIVE ISSUES Check all that apply:	Date Initiated:
☐ Explanation of Significant Differences in progress	
☐ Record of Decision (ROD) Amendment in progress	
☐ Site in O&F period	
☐ Long-Term Response Action (LTRA) in progress	
☐ LTRA Transition to O&M in progress	
☐ Notice of Intent to Delete site in progress	
☐ Partial Site Deletion in progress	
☐ Technical Impracticability (TI) Waivers in progress	
☐ Reuse Assessment or Reuse Plan in progress	
☐ Revised Risk Assessment in progress ☐ Ecological OR ☐ Human Health	
☐ Other administrative issues:	

VI. O&M COSTS The purpose of this section is to document what is known about O&M costs for this site. It is realized that not all cost information will be readily available, but to the extent possible, please provide the following information, as this will help identify cost increases and flag potential budget issues before they arise.	
What was the total annual O&M cost for the previous year?	
What is the expected total annual O&M cost for the upcoming year?	
Please provide an approximate breakout of the previous year's O&M costs below.	**Use either $ or %**
Analytical (e.g., lab costs):	
Materials (e.g., treatment chemicals, cap materials):	
Oversight (e.g., project management):	
Monitoring (e.g., ground water sampling):	
Utilities (e.g., electric, gas, phone, water):	
ICs (implementation and enforcement):	
Other (e.g., capital improvements, equipment repairs):	
Describe any unanticipated/unusually high or low O&M costs and potential future O&M funding issues.	

VII. INSTITUTIONAL CONTROLS (ICs)**

The purpose of the IC evaluation at the O&M phase is to determine if the ICs are implemented, effective and durable. The following references may be useful for completing this evaluation:

- *Institutional Controls Bibliography: Institutional Control, Remedy Selection, and Post Construction Completion Guidance and Policy* (OSWER 9355.0110, December 2005);
- *Supplement to the Comprehensive Five-Year Review Guidance; Evaluation of Institutional Controls* (OSWER 9355.7-12, working draft 3/17/05);
- *National IC Strategy to Ensure Institutional Controls Implementation at Superfund Sites* (OSWER 9355.0-106, September 2004); and
- *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanup* (OSWER 9355.0-7-4FS-P, September 2000).

** Note: A separate O&M checklist has been developed for surface water/sediment remedies. For completeness, answer this question regarding ICs, and enter more detailed information in the surface water/sediment checklist.

Identify each IC (media, objective, and instrument) implemented/to be implemented at the site. Attach an extra sheet if necessary.	
Are the ICs adequate to minimize the potential for human exposure and protect the integrity of the remedy? If no, please explain.	☐ Yes ☐ No
Please identify the party responsible for compliance and enforcement of the IC.	
Please describe what the ICs are intended to accomplish, who they are designed to inform, the source document for the IC, and where the IC information is located.	
Please identify the date when the ICs were implemented. If the ICs have yet to be implemented, please identify the party responsible for implementing the ICs and the scheduled implementation date.	
If the ICs have been implemented, are they still in place? If the ICs remain in place, please identify whether there is a planned termination date and, if so, what it is.	
Are there reasons to clarify or modify the appropriate decision document(s) to improve the effectiveness and/or durability of the ICs? If yes, please explain and describe any plans to clarify/modify the document(s).	☐ Yes ☐ No

VIII. TECHNICAL DATA AND REMEDY PERFORMANCE

The purpose of this section is to help prompt questions about remedy performance over the past year, the adequacy of monitoring activities to assess remedy performance, and changes in field conditions or understanding that could affect the remedy. Specific sections also prompt questions about remedy optimization. Addressing these questions on an annual basis can help to flag opportunities and potential issues to watch in the coming year and help inform future improvements in remedy O&M. The collection of annual checklists can also serve as documentation of when a potential issue was first identified, what was done to address it, and when it was addressed. Thus, an annual checklist can be a useful, succinct source of information to help RPMs recount O&M history.

Questions for specific remedy types (e.g., ground water pump-and-treat) are contained in Appendices A through D at the end of the form. Appendix E contains general questions that can be used to document technical data and remedy performance for remedies and remedy components that do not fit within the specific categories identified in the remainder of this checklist. Identify the remedy types in Section VIII.A, below, and complete a copy of each appendix that is applicable to the site. If the site includes multiple remedies or remedy components of the same type, please complete a copy of the applicable appendix for each remedy/component (e.g., if the remedy includes two separately managed containment areas, complete two copies of Appendix C, one for each area). A separate O&M checklist has been developed for surface water/sediment remedies and remedy components. If the site includes a surface water/sediment remedy, note this below and complete the surface water/sediment checklist.

A. Please identify the type(s) of remedy(ies) this Annual O&M Remedy Evaluation Checklist addresses:

- ☐ Ground Water Pump-and-Treat (please complete Appendix A)
- ☐ Ground Water Monitored Natural Attenuation (MNA) (please complete Appendix B)
- ☐ Ground Water or Soil Containment (please complete Appendix C)
- ☐ Soil Vapor Extraction/Air Sparging (please complete Appendix D)
- ☐ Other Remedy Types (please complete Appendix E)

IX. RECOMMENDATIONS

New Recommendations, from this annual review:

Recommendation	Party Responsible	Milestone Date

APPENDICES

TECHNICAL DATA AND REMEDY PERFORMANCE ANNUAL O&M /REMEDY EVALUATION CHECKLIST

RECOMMENDED APPENDIX A. GROUND WATER PUMP-AND-TREAT REMEDIES

The following checklist is an abbreviated set of questions that could be used by an EPA RPM for annually reviewing the O&M of a ground water pump-and-treat remedy, including pump-and-treat remedies designed for hydraulic containment. This checklist was developed using concepts presented in EPA guidance, *Elements for Effective Management of Operating Pump and Treat Systems* (EPA 542-R-02-009, December 2002). This guidance is part of a series of fact sheets that EPA OSRTI has prepared as guidance to the ground water remediation community on effectively and efficiently designing and operating long-term ground water remedies. For more information, including the guidance *O&M Report Template for Ground Water Remedies (with Emphasis on Pump and Treat Systems)* (EPA 542-R-05-010, April 2005) and report *Pilot Project to Optimize Superfund-Financed Pump and Treat Systems: Summary Report and Lessons Learned* (EPA 542-R-02-008a), visit EPA's CLU-IN Website (www.cluin.org/).

A. Remedy Goals and Conceptual Site Model (CSM)

1. Review of the current remedy goals and measurements: Remedy goals may be expressed in terms of a broad, long-term purpose or intent specified in a decision document (e.g., cleanup to a specified concentration), a performance-based metric or milestone intermediate in duration (e.g., a 20% decrease in monthly influent concentrations within 24 months of operation); or a specific and short-term objective (e.g., demonstration of plume containment).

List the short-term objectives and intermediate system goals:	
List the final system goals:	
What metrics (performance criteria) are being implemented to measure project progress towards meeting each goal?	
What schedule has been established for measuring and reporting each metric?	
Based on new information or events since the last O&M review, is there a reason to re-evaluate the system goals? Note: this might be due to factors such as regulatory framework has been revised; better technology/strategy alternatives available; existing goals appear unrealistic; costs greater than originally anticipated; extent of plume has changed; new sources of contamination removed and/or discovered; or land use or ground water production near site has changed. If yes, identify the remedy goals that should be re-evaluated, the rationale, and any plans for re-evaluating the goals.	☐ Yes ☐ No

2. Review of changes to the CSM: The CSM is a combination of text and figures that describe the hydrogeologic system, the cause of the ground water impacts, and the fate and transport of the ground water contaminants. If monitoring data during active remediation do not agree with expectations, this could point to a gap in the conceptual model that should be addressed with a focused investigation. This does not imply a return to the "remedial investigation" phase. The CSM should evolve over time, including during active remediation, as more information about the site becomes available. The following questions may be used to evaluate the need for updating the CSM:

Since the last time you completed the O&M checklist for this system, have new contaminant sources been identified or have previously suspected contaminant sources been eliminated from further consideration? If yes, use this space to comment.	☐ Yes ☐ No
Since the last time you completed an O&M checklist for this system, have new contaminants been identified in the ground water that could affect remedy effectiveness? If yes, use this space to comment.	☐ Yes ☐ No
Based on your answers to the above questions, would it be useful to update the CSM at this time?	☐ Yes ☐ No

If yes, please describe any plans to update the CSM.	

B. Remedy Performance Assessment

1. Evaluate remedy effectiveness: The following questions are intended to review whether the ground water pump-and-treat remedy is performing as intended and whether there are opportunities for optimizing the remedy.

Plume Capture

When addressing these questions, it may be useful to refer to *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems* (EPA 600/R-08/003, January 2008).

Has a three-dimensional target capture zone been clearly defined? If no, use this space to explain why not.	☐ Yes ☐ No
If not clearly defined, describe plans to better define the target capture zone.	
What lines of evidence have been used to evaluate actual capture achieved (e.g., flow budget and/or capture zone width calculations, potentiometric surface maps, water elevation pairs, concentration trends at wells beyond the target capture zone, particle tracking in conjunction with ground water modeling, tracer tests)	

System Equipment/Structures (e.g., extraction wells, collection systems)

Since the last time you completed an O&M checklist for this system, has the downtime associated with non-routine operations and maintenance exceeded expectations? If yes, what systems have been responsible for unplanned downtime (e.g., extraction pumps, wastewater facilities)? If yes, what corrections have been or are being made to minimize downtime?	☐ Yes ☐ No
Since the last time you completed the O&M checklist for this remedy/remedy component, have any major repairs to the pump-and-treat system(s) been required? If yes, describe the repairs, their impact on progress toward remediation milestones, and actions taken to minimize similar repairs in the future.	☐ Yes ☐ No
Since the last time you completed an O&M checklist for this system, have the extraction/injection well rates changed significantly? If yes, describe the known/suspected source of the change, if identified. If yes, is the change reflective of a long-term condition and, if so, how will this be addressed in the O&M of the system?	☐ Yes ☐ No
Since the last time an O&M checklist was completed for this system, have air emissions from the system met permit requirements, if any? If not, what is being done to meet the permit requirements?	☐ Yes ☐ No ☐ N/A
Since the last time an O&M checklist was completed for this system, has effluent discharge met permit requirements? If not, what was (is) the problem and what was (or will be) done to correct it?	☐ Yes ☐ No

Optimization

Has an optimization study been conducted for this system?	☐ Yes ☐ No
If an optimization study has been conducted, have any of the optimization recommendations been implemented since the last time an O&M checklist was completed for this system?	☐ Yes ☐ No ☐ N/A
If optimization recommendations have been implemented (during this or prior review periods), describe any new results observed or conclusions drawn since the last time an O&M checklist was completed for this system.	
If optimization recommendations have not been implemented, why not?	

2. Evaluate collection and analysis of performance monitoring data	
Do the approaches used to interpret ground water monitoring data (e.g., concentration trend analyses, plume contour and/or bubble maps, plume cross-sections, potentiometric surface maps) provide adequate information to assess the performance of the pump-and-treat remedy? If no, describe plans, if any, to implement new approaches.	☐ Yes ☐ No
Based on information collected since the last O&M review, is there a need to re-evaluate the parameters, sampling methods, sampling frequency, and monitoring locations used to evaluate remedy performance?	☐ Yes ☐ No
Are ground water data managed electronically? If no, use this space to explain why not.	☐ Yes ☐ No
Are performance-monitoring reports of sufficient quality and frequency to evaluate the efficacy of the remedy and recognize protectiveness problems in time for effective action? If no, what actions, if any, have been taken or are planned to address this situation?	☐ Yes ☐ No
C. Cost Effectiveness	
Are actual parameters consistent with design parameters (based on process monitoring)? If not, how do they differ? (check all that apply) ☐ Influent rate to treatment plant ☐ Influent concentrations ☐ Mass loading to the system ☐ Removal efficiency for each treatment component ☐ Air to water ratio (air strippers) ☐ Materials usage (e.g., granular activated carbon (GAC), chemicals) ☐ Other (please explain)	☐ Yes ☐ No
Based on the above comparisons, have any above ground systems or process monitoring procedures been evaluated/implemented to reduce costs? If yes, please identify which of the following have been done to reduce costs. (check all that apply) ☐ Ensuring proper maintenance and efficiency of equipment ☐ Replacing treatment components with alternate technologies (e.g., replace UV/Oxidation with air stripping) or more appropriately sized components ☐ Eliminating unnecessary or redundant treatment components that are no longer needed (e.g., metals removal or GAC polishing system) ☐ Changing discharge ☐ Automating system to reduce labor ☐ Optimizing ground water extraction rates and/or locations ☐ Other (please explain)	☐ Yes ☐ No
D. Remedial Decisions: Indicate which of the following remedial decisions is appropriate at the present time and provide the basis for the decision.	
☐ No Change to the System ☐ Modify/Optimize System ☐ Modify/Optimize Monitoring Program ☐ IC Modifications ☐ Implementation of Contingency/Alternative Remedy	
Basis for decision:	

RECOMMENDED APPENDIX B. GROUND WATER MONITORED NATURAL ATTENUATION (MNA) REMEDIES

The following checklist is an abbreviated set of questions that could be used by an EPA RPM for annually reviewing the O&M of a MNA remedy for ground water. This MNA guidance checklist was developed using concepts presented in EPA guidance, *Performance Monitoring of MNA Remedies for* [volatile organic compounds] *(VOCs) in Ground Water* (EPA/600/R-04/027; April 2004). For some approaches, a more detailed remedy optimization study or remediation system evaluation (RSE) may be beneficial. For guidance on remedy optimization studies or RSEs, visit EPA's CLU-IN Website (www.cluin.org/) or the U.S. Army Corps of Engineers (USACE) Hazardous, Toxic and Radioactive Waste Center of Expertise RSE Website (www.environmental.usace.army.mil/)

A. Remedy Goals and Conceptual Site Model (CSM)

1. Review of the current remedy goals and measurements: The remedy goals may be expressed in the ROD as remedial action objectives (RAOs) and preliminary remediation goals (PRGs). RAOs provide a general description of what the cleanup will accomplish (e.g., restoration of ground water). PRGs are the more specific statements of the desired endpoint concentrations or risk levels, for each exposure route, that are believed to provide adequate protection of human health and the environment.

List the intermediate system goals (RAOs and PRGs).	
List the final system goals (RAOs and PRGs).	
What metrics (performance criteria) are being implemented to measure project progress towards meeting each goal?	
What schedule has been established for measuring and reporting each metric?	
Based on new information or events since the last review, is there a need to re-evaluate the remedy goals? Note: this might be due to factors such as whether the regulatory framework has been revised, whether existing goals appear realistic, and if there have been changes to land use or ground water production near the site. If yes, identify the remedy goals that should be re-evaluated, the rationale, and any plans for re-evaluating the goals.	☐ Yes ☐ No

2. Review of changes to the CSM: The CSM for natural attenuation is the site-specific qualitative and quantitative description of the migration and fate of contaminants with respect to possible receptors and the geologic, hydrologic, biologic, geochemical and anthropogenic factors that control contaminant distribution. Because the CSM provides the basis for the remedy and monitoring plan, it can be reevaluated as new data are developed throughout the lifetime of the remedy. The following questions may be used to evaluate the need for updating the CSM:

Have new contaminant sources been identified or have previously suspected contaminant sources been eliminated from further consideration since the last time you completed the O&M checklist for this remedy? If yes, use this space to comment.	☐ Yes ☐ No
Has there been an increase or decrease in size of the plume since the last time you completed an O&M checklist for this remedy? Comments (e.g., what is the nature and magnitude of the change).	☐ Increase ☐ Decrease ☐ No change
Has there been an increase or decrease in vertical extents of the plume since the last time you completed an O&M checklist for this remedy? Comments (e.g., what is the nature and magnitude of the change).	☐ Increase ☐ Decrease ☐ No change
Has there been an increase or decrease in the maximum contaminant concentrations in the plume since the last time you completed an O&M checklist for this remedy? Comments (e.g., have maximum concentrations changed for all or a subset of contaminants, which ones, and by how much).	☐ Increase ☐ Decrease ☐ No change
What types of reaction zone(s) are present in the plume (aerobic, anaerobic, or both)?	

Based on information collected since the last O&M review, is there a need to re-evaluate the number and/or location of monitoring points in the reaction zone(s)? If yes, use this space to comment.	☐ Yes ☐ No
Based on information collected since the last O&M review, is there a need to re-evaluate the number and/or location of monitoring points in the target zones? If yes, use this space to comment.	☐ Yes ☐ No
Has there been a change in ground water flow rate or direction that may suggest monitoring frequency or locations may need to be reevaluated? If yes, use this space to comment.	☐ Yes ☐ No
Is there evidence of periodic pulses of residual contamination from the vadose zone that suggest new monitoring points should be added in the vadose zone? If yes, use this space to comment.	☐ Yes ☐ No
If there is reason to re-evaluate the number and location of monitoring points and/or monitoring frequency (as indicated in above responses), identify any plans for re-evaluating the monitoring program.	
Based on your responses to the above questions, would it be useful to update the CSM at this time? If yes, please describe any plans to update the CSM.	☐ Yes ☐ No

B. Remedy Performance Assessment

1. Review performance monitoring objectives. The OSWER Directive 9200.4-17P (U.S. EPA, 1999a) provides eight specific objectives for the performance-monitoring program of an MNA remedy.

For each of the following eight performance monitoring objectives, identify which are currently being met, which are currently being met but could benefit from further review, and which are currently not being met.

Objective	Status		
	Being met	*Benefit from review*	*Not being met*
1) Demonstrate that natural attenuation is occurring according to expectations	☐	☐	☐
2) Detect changes in environmental conditions that may reduce the efficacy of any of the natural attenuation processes	☐	☐	☐
3) Identify any potentially toxic and/or mobile transformation products	☐	☐	☐
4) Verify that the plume(s) is not expanding downgradient, laterally or vertically	☐	☐	☐
5) Verify no unacceptable impact to downgradient receptors	☐	☐	☐
6) Detect new releases of contaminants to the environment that could impact the effectiveness of the natural attenuation remedy	☐	☐	☐
7) Demonstrate the efficacy of ICs that were put in place to protect potential receptors	☐	☐	☐
8) Verify attainment of remediation objectives	☐	☐	☐

If any of these objectives are not being met or would benefit from review, please describe (e.g., in what way is the objective not being met, why might the objective benefit from further review).

Describe any plans to review and/or change the location, frequency or types of samples and measurements to meet this (these) objective(s).

2. Evaluate remedy effectiveness: The following questions are intended to review whether the MNA remedy is performing as intended, or whether there may be a need to implement a contingency remedy. A contingency remedy is a cleanup technology or approach that functions as a backup remedy in the event that the selected remedy fails to perform as anticipated.	
Since the last O&M review, have contaminant concentrations in soil or ground water at specified locations exhibited an increasing trend not originally predicted during remedy selection?	☐ Yes ☐ No
Since the last O&M review, have near-source wells exhibited large concentration increases indicative of a new or renewed release?	☐ Yes ☐ No
Since the last O&M review, have contaminants been detected in monitoring wells located outside of the original plume boundary or other compliance-monitoring boundary?	☐ Yes ☐ No
Since the last O&M review, have analyses concluded that the rate of decrease of contaminant concentrations may be inadequate to meet the remediation objectives?	☐ Yes ☐ No
Since the last O&M review, have changes in land and/or ground water use been suggested and or implemented that have the potential to reduce the protectiveness of the MNA remedy?	☐ Yes ☐ No
Since the last review, have contaminants been identified in locations that pose or have the potential to pose unacceptable risk to receptors?	☐ Yes ☐ No
If you answered yes to any of the above questions, did the information suggest the need for immediate action or is the condition being monitored to evaluate the need for future action? Use this space to comment.	☐ Immediate action ☐ Monitored for future ☐ N/A
Based on your answers to the above questions, is there reason to evaluate the need for a contingent remedy at this time? If yes, use this space to comment.	☐ Yes ☐ No
3. Evaluate collection and analysis of performance monitoring data	
What evidence has been used to evaluate actual plume dissipation (e.g., temporal trends in individual wells, estimation of mass reduction, comparisons of observed contaminant distributions with predictions and required milestones, comparison of field-scale attenuation rates)?	
Since the last O&M review, has it been necessary to modify the site-specific plans (e.g., Sampling and Analysis Plan, Quality Assurance Project Plan, Data Management Plan) to account for new information and/or unforeseen circumstances? If yes, use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review suggest the need to evaluate whether field parameters that are critical to an MNA evaluation (e.g., dissolved oxygen, redox potential) are being collected at appropriate monitoring points? If yes, use this space to comment.	☐ Yes ☐ No
Do the approaches used to interpret ground water monitoring data (e.g., concentration trend analyses, plume contour and/or bubble maps, plume cross-sections, potentiometric surface maps) provide adequate information to assess the performance of the natural attenuation remedy? If no, describe plans, if any, to implement new approaches.	☐ Yes ☐ No
Does information collected since the last O&M review suggest the need to re-evaluate the ground water and soil-monitoring program to more accurately delineate and monitor the plume boundary? If yes, use this space to comment.	☐ Yes ☐ No
Since the last O&M review, has it been necessary to modify the data quality assessment, including statistical tests (if appropriate), regression analysis, scatter plots, etc. to account for new information and/or unforeseen circumstances? If yes, use this space to comment.	☐ Yes ☐ No
Are ground water data managed electronically? If no, use this space to explain why not.	☐ Yes ☐ No

If statistical tests are used, do the data meet the assumptions of the statistical test?	☐ Yes ☐ No
If no, does this suggest the need to change the monitoring program or re-evaluate the statistical approach? Use this space to comment.	☐ Evaluate monitoring program ☐ Evaluate statistical approach ☐ Neither
Is high variability in the data interfering with or preventing a meaningful interpretation of the data?	☐ Yes ☐ No
If yes, could this situation be mitigated by increasing the density or frequency of sampling? Use this space to comment.	☐ Yes ☐ No
Are performance-monitoring reports of sufficient quality and frequency to evaluate the efficacy of MNA as a remedy and recognize protectiveness problems in time for effective action? If no, what actions, if any, have been taken or are planned to address this situation?	☐ Yes ☐ No
Are techniques or models being used to evaluate adequacy/redundancy of individual wells in the monitoring network, and adequacy/redundancy of sampling frequency? Note that techniques may range from statistical trend analysis to application of ~~a~~ decision support tool.	☐ Yes ☐ No
If no, are there plans to evaluate the adequacy/redundancy of individual monitoring wells and/or sampling frequency? Use this space to comment.	☐ Yes ☐ No
C. Cost Effectiveness: Key considerations in looking at cost-effectiveness of an MNA remedy are the list of parameters for monitoring, as well as the frequency and location of monitoring. Decreases in monitoring parameters, frequency or locations may be appropriate and allow for reductions in project monitoring costs. For example, decreases in monitoring frequency for certain parameters may be warranted if the remedy is proceeding according to expectations and trends are stable after evaluation of data from a sufficient number of monitoring periods (e.g., many years). To support such a decision, the available data generally cover a time period sufficient to allow for an evaluation of seasonal trends and other long-term cycles and trends.	
Does information collected since the last O&M review suggest opportunities to eliminate monitoring points (e.g., because of redundancy, unreliability, or changes in program objectives)? If yes, use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review suggest opportunities to replace current analytical and sampling methods with less expensive methods and still meet the data quality objectives? If yes, use this space to comment.	☐ Yes ☐ No
Can the analyte list be shortened to focus on the known contaminants of concern?	☐ Yes ☐ No
D. Remedial Decisions: Following data evaluation, decisions are routinely made regarding the effectiveness of the MNA remedy, monitoring program, and ICs, and the need for contingency or alternative remedies. The following remedial decisions are discussed in Section 4 of the EPA guidance document *Performance Monitoring of MNA Remedies for VOCs in Ground Water* (EPA/600/R-04/027; April 2004). Indicate which of the following remedial decisions is appropriate at the present time and provide the basis for the decision.	
☐ No Change to the Monitoring Program ☐ Modify/Optimize Monitoring Program ☐ IC Modifications ☐ Implementation of Contingency/Alternative Remedy ☐ Terminate Performance Monitoring and Initiate Verification Monitoring	
Basis for decision:	

RECOMMENDED APPENDIX C. CONTAINMENT REMEDIES

The following checklist is an abbreviated set of questions that could be used by a EPA RPMs for an annual review of the O&M of a containment remedy and associated off-gas treatment system. This checklist focuses on engineered containment remedies, including landfill caps, covers, and vertical engineered barriers (VEB). Containment by other means such as hydraulic control and in-situ sediment containment remedies are not addressed by this appendix. See separate surface water/sediment remedy checklist for sediment remedies. Although the checklist includes items for off-gas systems, it focuses on off-gas collection. The checklist does not address off-gas management using combustion systems because such systems are uncommon at Superfund sites.

A. Remedy Description, Goals and Conceptual Site Model (CSM)

1. Review of the current remedy

Identify the containment systems in place:

- ☐ Cap/cover
- ☐ VEB
- ☐ Liner
- ☐ Landfill gas collection
- ☐ Landfill gas management
- ☐ Leachate detection
- ☐ Leachate collection
- ☐ Leachate management
- ☐ Other (Describe:)

Identify the O&M components:

- ☐ Inspection
- ☐ Monitoring
- ☐ Testing
- ☐ Ground water monitoring
- ☐ Surface water monitoring
- ☐ Landfill gas monitoring
- ☐ Vapor intrusion monitoring
- ☐ Leachate monitoring
- ☐ Other (Describe:)

2. Review of the current remedy goals

Identify the remedy goals (RAOs):

- ☐ Prevent direct contact with a contaminant source
- ☐ Prevent migration of a contaminant source to:
  - ☐ A drinking water aquifer
  - ☐ Surface water
  - ☐ Soil or other solid media
  - ☐ Air (via wind-borne material)
  - ☐ Air (via volatilization)
  - ☐ Other (Describe:)
- ☐ Prevent migration of contaminated ground water
- ☐ Prevent vapor intrusion or indoor air exposure
- ☐ Control off-gas
- ☐ Other remedy goals (Describe:)

What metrics (performance criteria) are being implemented to measure project progress towards meeting each goal?

What schedule has been established for measuring and reporting each metric?

Based on new information or events since the last O&M review, is there a need to re-evaluate the remedy goals? This might be due to factors such as whether the regulatory framework has been revised, whether existing goals appear to be realistic, and whether there have been changes in land use or ground water production near the site. If yes, identify the remedy goals that should be re-evaluated, the rationale, and any plans for re-evaluating the goals.	☐ Yes ☐ No

3. Review of changes to the CSM: The CSM for a containment remedy is the site-specific, qualitative and quantitative description of the migration and fate of contaminants with respect to possible receptors and the geologic, hydrologic, biological, geochemical and anthropogenic factors that control contaminant distribution. Because the CSM provides the basis for the remedy and the post-closure maintenance plan or O&M plan, the model should be re-evaluated as new data are collected throughout the lifetime of the remedy.	
Does new information gathered or conclusions reached since the last time the O&M checklist was completed indicate a change in understanding about the sources, types, migration, and fate of contaminants? *Note that indicators could include (1) the remedy not functioning as designed, (2) unexpected contaminants or contaminant concentrations above the required levels at the point of compliance, (3) unexpected trends in contaminant concentrations, (4) unexpected changes in the flow rate or direction of ground water, (5) unexpected changes in off-gas characteristics, or (6) unexpected evidence of vapor intrusion in nearby structures.*	☐ Yes ☐ No
Based on new information and/or conclusions, would it be useful to update the CSM at this time? If yes, please describe any plans to update the CSM.	☐ Yes ☐ No
B. Remedy Performance Assessment This section contains a series of questions that can be used to help assess a containment remedy's effectiveness and evaluate the collection and analysis of performance monitoring data. For each potential problem identified, an analysis should be performed to determine what, if anything should be done.	
1. Evaluate remedy effectiveness: The following questions are intended to review whether the containment remedy is performing as intended or whether there is a need to implement a contingency remedy. A contingency remedy is a cleanup technology or approach that functions as a backup remedy in the event that the selected remedy fails to perform as anticipated. A contingency remedy may be considered if there is a "yes" answer to one or more of the following three questions. *Note that additional measures and methods for evaluating the effectiveness of containment remedies can be found in "EPA/USACE Draft Technical Guidance for RCRA/CERCLA Final Covers" (EPA 540-R-04-007) and "EPA Comprehensive 5-Year Review Guidance, Appendix D, Five-Year Review Site Inspection Checklist" (OSWER Directive 9355.7-03B-P).*	
Since the last O&M review, has inspection or testing of the cap, cover, liner, or VEB indicated that the system is failing or could eventually fail?	☐ Yes ☐ No
Since the last O&M review, have changes in land, surface water, or ground water use been suggested and or implemented that have the potential to reduce the protectiveness of the containment remedy?	☐ Yes ☐ No
Since the last O&M review, have contaminants been identified in new locations or at higher concentrations where they pose or have the potential to pose unacceptable risks to receptors?	☐ Yes ☐ No
If you answered yes to any of the above questions, did the information suggest the need for immediate action or is the condition being monitored to evaluate the need for future action? Use this space to comment. What actions, if any, have been taken and/or are planned in response to the new information?	☐ Immediate action ☐ Monitored for future ☐ N/A
For VEB Only: Note that additional measures and methods for evaluating VEB effectiveness can be found in "EPA Evaluation of Subsurface Engineered Barriers at Waste Sites".	
Have bulk integrity tests been performed since the last O&M review?	☐ Yes ☐ No

If bulk integrity tests have been performed since the last review, do test results indicate that need to evaluate possible breaches or excessive leakage in the VEB over the short and long terms? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No ☐ N/A
Based on information collected since the last O&M review, do contaminant concentrations upgradient of the VEB indicate the need to evaluate actions to prevent possible contaminant migration? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Does information collected since the last O&M review suggest the need to evaluate hydraulic controls as an additional measure to control possible contaminant migration around the VEB (answer N/A if hydraulic controls are already part of the remedy)? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No ☐ N/A
For Off-Gas Collection Management Only: Note that additional measures and methods for evaluating off-gas collection and management effectiveness can be found in "USACE Landfill Off-Gas Treatment, Thermal Oxidation Checklist".	
Since the last O&M review for this system, have off-gas volume and composition been consistently within equipment design parameters? If no, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Since the last O&M review for this system, have off-gas system operational characteristics, such as required temperatures and pressures, been maintained within system design parameters? If no, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Since the last time an O&M checklist was completed for this system, have off-gas emissions met all federal, state, and local regulatory requirements? If no, what is being done to meet these requirements?	☐ Yes ☐ No
Based on information collected since the last O&M review, is there any evidence of unacceptable vapor intrusion in nearby structures? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Based on information collected since the last O&M review, have concentrations of off-gases inside buildings or at the site fence line suggested the need to assess safety and human health threats? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
2. Evaluate collection and analysis of performance monitoring data Note that more detailed information about performance parameters can be found in the following documents: ▪ "EPA/USACE Draft Technical Guidance for RCRA/CERCLA Final Covers" (EPA 540-R-04-007) ▪ "EPA Comprehensive 5-Year Review Guidance, Appendix D, Five-Year Review Site Inspection Checklist" (OSWER Directive 9355.7-03B-P) ▪ "USACE Landfill Off-Gas Treatment, Thermal Oxidation Checklist" ▪ "EPA Evaluation of Subsurface Engineered Barriers at Waste Sites" (EPA 542-R-98-005; August 1998).	
Since the last O&M review, has it been necessary to modify planned inspections, sampling events, and sample analyses, as reflected in the site post-closure maintenance plan or O&M plans, to account for new information and/or unforeseen circumstances? If yes, use this space to comment.	☐ Yes ☐ No
Has information collected since the last O&M review suggested the need to re-evaluate whether performance parameters that are critical to evaluation of the containment remedy are being collected at appropriate monitoring points? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No

Are ground water and off-gas system monitoring data managed electronically? If no, use this space to explain why not.	☐ Yes ☐ No
Since the last O&M review, have monitoring data been analyzed to identify trends and their significance? If no, use this space to explain why not.	☐ Yes ☐ No
Is high variability in the data interfering with or preventing a meaningful interpretation of the data?	☐ Yes ☐ No
If yes, could this situation be mitigated by increasing the density or frequency of data collection? Use this space to comment.	☐ Yes ☐ No
Are inspection and performance monitoring reports of sufficient quality and frequency to evaluate the efficacy of containment as a remedy and recognize protectiveness problems in time for effective action? If no, what actions, if any, have been taken or are planned to address this situation?	☐ Yes ☐ No
C. Cost-Effectiveness	
If off-gas is currently being treated, can it be vented to the atmosphere without treatment in compliance with all applicable federal, state, and local regulations?	☐ Yes ☐ No ☐ N/A
If yes, has the possibility of discontinuing off-gas treatment been explored? Use this space to comment.	☐ Yes ☐ No ☐ N/A
If leachate is currently being collected and treated, is operation of the leachate system necessary for proper functioning of the containment system?	☐ Yes ☐ No ☐ N/A
If no, has the possibility of discontinuing leachate collection and treatment been explored? Use this space to comment.	☐ Yes ☐ No ☐ N/A
If hydraulic controls are being used in conjunction with a VEB, would the VEB provide passive containment without these controls?	☐ Yes ☐ No ☐ N/A
If yes, has the possibility of discontinuing the hydraulic controls been explored? Use this space to comment.	☐ Yes ☐ No ☐ N/A
D. Remedial Decisions: Indicate which of the following remedial decisions is appropriate at the present time and provide the basis for the decision.	
☐ No change to the remedy ☐ Modify or optimize remedy ☐ Modify or optimize O&M ☐ Modify ICs ☐ Implement contingency or alternative remedy ☐ Terminate inspections or monitoring	
Basis for decision:	

RECOMMENDED APPENDIX D. SOIL VAPOR EXTRACTION/AIR SPARGING REMEDIES

- The following checklist is an abbreviated set of questions that EPA RPMs could use when conducting an annual review of the O&M of a soil vapor extraction (SVE), air sparging (AS), or combined SVE/AS remedy. This checklist does not represent the level of review used in EPA's five-year review process to determine whether the remedy is or will be protective of human health and the environment. However, the checklist does contain review elements regarding the performance of SVE and/or AS remedies that are consistent with the comprehensive five-year review process.

A. Remedy Description, Goals and Conceptual Site Model (CSM)

1. Review of the current remedy

Identify the current remedy:

- ☐ SVE
- ☐ AS

How many extraction wells or trenches are used for SVE (if applicable)?

How many injection wells are used for AS (if applicable)?

2. Review of the current remedy goals

List the remedy goals (RAOs):

- ☐ Prevent migration of a contaminant source to:
  - ☐ A drinking water aquifer
  - ☐ Surface water
  - ☐ Soil or other solid media
- ☐ Prevent migration of contaminated ground water
- ☐ Restore ground water
- ☐ Other (Describe:)

List the short-term objectives and intermediate system goals.

List the long-term soil and ground water cleanup goals.

What metrics (performance criteria) are being implemented to measure project progress towards meeting each goal?

What schedule has been established for measuring and reporting each metric?

Based on new information or events since the last O&M review, is there a reason to re-evaluate the remedy goals? Note that this might be due to factors such as whether the regulatory framework has been revised, whether existing goals appear to be realistic, and whether there have been changes in land or ground water use near the site. If yes, identify the remedy goals that should be re-evaluated, the rationale, and any plans for re-evaluating the goals.	☐ Yes ☐ No

3. Review of changes to the CSM: The CSM for a SVE/AS remedy is the site-specific, qualitative and quantitative description of the migration and fate of contaminants with respect to possible receptors and the geologic, hydrologic, biological, geochemical and anthropogenic factors that control contaminant distribution. Because the CSM provides the basis for the remedy and the O&M plan, the model should be re-evaluated as new data are collected throughout the lifetime of the remedy.	
Does new information gathered or conclusions reached since the last time the O&M checklist was completed indicate a change in understanding about the sources, types, migration, and fate of contaminants? *Note that indicators could include: (1) the remedy not functioning as designed, (2) unexpected contaminants or contaminant concentrations above the required levels at the point of compliance, (3) unexpected trends in contaminant concentrations, (4) unexpected changes in the flow rate or direction of ground water, (5) unexpected changes in off-gas characteristics, (6) unexpected evidence of vapor intrusion in nearby structures; or (7) identification of new sources.*	☐ Yes ☐ No
Based on new information and/or conclusions, would it be useful to update the CSM at this time? If yes, please describe any plans to update the CSM.	☐ Yes ☐ No
B. Remedy Performance Assessment This section contains a series of questions that can be used to help assess a SVE/AS remedy's effectiveness and evaluate the collection and analysis of performance monitoring data.	
1. Evaluate remedy effectiveness: The following questions are intended to review whether the SVE/AS remedy is performing as intended, or whether there is a need to implement a contingency remedy. A contingency remedy is a cleanup technology or approach that functions as a backup remedy in the event that the selected remedy fails to perform as anticipated. A contingency remedy may be considered if there is a "yes" answer to either of the following five questions.	
Based on information collected since the last O&M review, do monitoring data indicate that the system is failing or could eventually fail to meet remedy goals?	☐ Yes ☐ No
Since the last O&M review, has the areal extent of contamination (or plume) increased in a manner not originally predicted during remedy selection?	☐ Yes ☐ No
Since the last O&M review, have monitoring data exhibited trends indicative of a new or renewed release?	☐ Yes ☐ No
Since the last O&M review, have changes in land and/or ground water use been suggested and or implemented that have the potential to reduce the protectiveness of the SVE/AS remedy?	☐ Yes ☐ No
Since the last O&M review, have contaminants been identified in new locations or at higher concentrations where they pose or have the potential to pose unacceptable risks to receptors?	☐ Yes ☐ No
If you answered yes to any of the above questions, did the information suggest the need for immediate action or is the condition being monitored to evaluate the need for future action? Use this space to comment. What actions, if any, have been taken and/or are planned in response to the new information?	☐ Immediate action ☐ Monitored for future ☐ N/A
Based on your answers to the above questions, is there reason to evaluate the need for a contingent remedy at this time? If yes, use this space to comment.	☐ Yes ☐ No

Blowers and Piping	
Since the last O&M review for this system, has evidence of excessive corrosion of system components been observed? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Since the last O&M review, if blowers are operated intermittently, do VOC concentrations increase after they are shut off? How has this information been interpreted and what actions, if any, have been taken and/or are planned in response?	☐ Yes ☐ No ☐ N/A
Since the last O&M review, have blower operational characteristics, such as flow rate, pressure, and discharge temperatures, been consistently within equipment design parameters? If no, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Since the last O&M review, if water is manually removed from the extraction blower water separator, has water accumulation been observed that could adversely impact blower operation? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No ☐ N/A
Since the last O&M review, have all blowers, water separators, valves, and piping components been consistently operational?	☐ Yes ☐ No
Has the downtime associated with non-routine operations and maintenance of the blowers since the last time you completed an O&M checklist for this system exceeded expectations? If yes, what have been identified as the causes? If yes, what corrections have been or are being made to minimize downtime?	☐ Yes ☐ No
Does the operational history suggest that the preventative maintenance plan for the blowers needs to be re-evaluated? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No
Soil Vapor Extraction System	
Identify the SVE system characteristics, if any, that have deviated consistently/frequently from operational expectations since the last time an O&M checklist was completed for this system: ☐ Vapor flow rates at one or more extraction wells ☐ Vapor compositions (VOCs, CO_2, O_2) at one or more extraction wells ☐ Pressures at one or more extraction wells ☐ Flow at blower (prior to entry of any dilution air if used) ☐ Accumulation of water in the water separator	
Does this (do these) deviation(s) indicate a new condition since the last O&M review or an ongoing trend?	☐ New condition ☐ Ongoing trend ☐ N/A
What has been identified as the cause for this (these) deviation(s)?	
What actions, if any, have been or are being taken in response to this (these) deviation(s)?	
Based on information collected since the last O&M review, is there any evidence of unacceptable vapor intrusion in nearby structures? If yes, what actions have been taken and/or are planned in response?	☐ Yes ☐ No

Since the last O&M review, have gas concentrations in the blower discharge been running close enough to the lower explosive limit (LEL) or shown an increasing trend that suggests the need for action? *Note that specific compound LEL data are available in many chemistry texts as well as National Fire Protection Agency guidelines.* What actions, if any, have been taken and/or are planned in response to the new information?	☐ Yes ☐ No
Air Sparging System	
Since the last O&M review of the AS system, have flow rates at each injection well been consistently maintained within system design parameters? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No
Based on information collected since the last O&M review, have dissolved oxygen concentrations been maintained at a level sufficient to promote biological activity? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No
Since the last O&M review, are measured dissolved oxygen concentrations consistently indicative of good air/water contact rates (i.e., are concentrations near saturation)? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No
VOC Control System	
If the SVE system contains a VOC control device, has the device consistently met performance and compliance monitoring requirements (e.g., total VOC emission limits, specific compound limits, monitoring, air permit) since the last O&M review for this system? If no, what actions have been taken and/or planned in response?	☐ Yes ☐ No ☐ N/A
Since the last O&M review, has the VOC control system consistently meet required destruction and removal efficiencies? If no, what actions have been taken and/or planned in response?	☐ Yes ☐ No
Since the last O&M review, have any violations of air permits been reported? If yes, what has been or is being done to meet permit requirements?	☐ Yes ☐ No
Since the last time you completed an O&M checklist for this system, has the VOC control system been responsible for downtime associated with non-routine operations and maintenance? If yes, ▪ What was (were) the cause(s) for unplanned shutdown(s)? ▪ What has been done or is being done to minimize future downtime?	☐ Yes ☐ No
Thermal Oxidizers	
Since the last O&M review for this system, have the operational characteristics (e.g., LEL history of feed gas, operating temperature, inlet flow, oxygen level in flue gas, fuel use) been consistently within equipment design parameters? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No ☐ N/A
Since the last O&M review, has there been any indication of improper operation of flashback protection equipment (e.g., detonation arrestor, sealed drum)? If yes, what actions have been taken and/or planned in response?	☐ Yes ☐ No
Since the last O&M review, has there been any indication of improper operation of safety interlocks (e.g., high LEL, high oxidizer temperature, loss of flame, low fuel pressures)? If yes, what actions have been taken and/or planned in response?	☐ Yes ☐ No

If acid gases are present, have scrubber operations (e.g., scrubber liquid flow and pH, caustic use, scrubber blowdown and its treatment) been consistent with operational expectations since the last O&M review? If no, what actions have been taken and/or planned in response?	☐ Yes ☐ No
Carbon Adsorbers	
Does the unit have humidity controls?	☐ Yes ☐ No
Since the last O&M review for this system, have the operational characteristics (e.g., relative humidity data at adsorber inlet, adsorber operating temperature, carbon breakthrough, carbon change out history, operating velocity through adsorbers, adsorber discharge VOC data) been consistently within equipment design parameters? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No ☐ N/A
Other Control Devices	
Since the last O&M review for this system, have the operational characteristics (e.g., biofiltration media surface loading rate, temperature controls, nutrient addition rate) been consistently within equipment design parameters? If no, what actions, if any, have been or are being taken in response?	☐ Yes ☐ No ☐ N/A
2. Evaluate collection and analysis of performance monitoring data	
Since the last O&M review, has it been necessary to modify sampling frequency relative to the original O&M plan to account for new information and/or unforeseen circumstances? If yes, use this space to comment.	☐ Yes ☐ No
Does soil and/or ground water data collected since the previous O&M review (e.g., VOCs concentrations, ground water elevations) suggest the need to re-evaluate other aspects of the monitoring program (e.g., monitoring locations, test parameters) to account for new information/unforeseen circumstances? If yes, use this space to comment.	☐ Yes ☐ No
C. Cost Effectiveness: Key considerations in looking at cost-effectiveness are the O&M costs incurred relative to design and reduction in VOC removal rates. Opportunities to reduce costs can be potentially found in the following areas:	
Does information collected since the last O&M review suggest that flows could be redistributed to speed overall remediation (i.e., reduce or eliminate flow to/from wells where removals have reached near asymptotic conditions or where cleanup goals have been achieved)? Use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review show evidence of diffusion-limited VOC movement?	☐ Yes ☐ No
If yes, has the idea of modifying operation to pulsing (intermittent) been considered to speed overall remediation? Use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review show reduced VOC removal rates that might warrant a reduction in monitoring frequencies? Use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review suggest that VOC recovery rates have been reduced to the extent that the VOC control device can be eliminated? Use this space to comment.	☐ Yes ☐ No ☐ N/A

Does information collected since the last O&M review suggest that an alternative, lower cost VOC control device could be used? Use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review suggest that operation of the VOC control device could be modified to reduce costs, e.g., operate thermal oxidizer at lower temperatures or lower dilution air flows (e.g., when LEL basis no longer requires design flow) or use larger carbon beds to reduce carbon supplier charges for change outs? Use this space to comment.	☐ Yes ☐ No
Has maintenance history since the last O&M review identified high-maintenance equipment that could be replaced? Use this space to comment.	☐ Yes ☐ No

E. Remedial Decisions: Indicate which of the following remedial decisions are appropriate at the present time and provide a basis for each decision:

- ☐ Continue current remedy
- ☐ Goals have been achieved -- system can be shutdown in favor of MNA
- ☐ Modify/optimize remedial system(s) – use intermittent operation; optimize flows to/from wells to promote increased removals; increase use of sparging to promote biodegradation; add new wells if contaminant movement is indicated to areas currently not being influenced; implement cost reduction measures; conduct more detailed evaluation of the contaminated zone using a tool such as Pneulog.
- ☐ Modify/optimize O&M – increase monitoring to provide additional data for more definitive assessment at the next review
- ☐ Modify ICs
- ☐ Implement contingent or alternative remedy

Basis for decision:

RECOMMENDED APPENDIX E. OTHER REMEDY TYPES/COMPONENTS

The following checklist is a set of questions that may be used by EPA RPMs for an annual review of the O&M of remedies and remedy components that are not addressed in Appendices A through D or the separate surface water/sediment remedy O&M checklist. This could include remedies/components that involve a technology that is not covered in these other materials or remedies/components where the O&M can be more efficiently reviewed using the more streamlined questions below. If the site includes multiple remedy components that are not covered elsewhere, multiple copies of this appendix, each applying to a different component or related set of components, could be completed.

A. Remedy Description and Goals

1. Review of current remedy goals, and measurements

The following questions can be used to document basic information about the remedy and remedy goals to provide context for the remainder of the information in this appendix.

Identify the remedy component(s) and associated systems and technologies being covered on this form:	
What are the intermediate and final system goals?	
What metrics (performance criteria) are being implemented to measure project progress towards meeting each goal?	
What schedule has been established for measuring and reporting each metric?	
Based on new information or events since the last O&M review of this system/technology, is there a need to re-evaluate the remedy goals? If yes, identify the remedy goals that should be re-evaluated, the rationale, and any plans for re-evaluating the goals.	☐ Yes ☐ No

2. Review of changes to the CSM

The following questions ask about changes in contamination and other field conditions that could affect the monitoring program, system operations, and other aspects of O&M. They provide context for questions in subsequent sections that ask whether action should be taken to modify the O&M program.

Do monitoring data indicate trends/patterns that are inconsistent with the CSM (or similar conceptual understanding of site conditions) that was used as the basis for design of the remedy/remedial component(s)? If yes, use this space to comment.	☐ Yes ☐ No
Have there been changes in field conditions (e.g., change in land/water use) that differ significantly from the conditions incorporated in the CSM (or similar conceptual understanding of site conditions) that was used as the basis for design of the remedy/remedial component(s)? If yes, use this space to comment.	☐ Yes ☐ No
Have new contaminant sources been identified? If yes, please describe the new sources and how they are they being addressed:	☐ Yes ☐ No

B. Remedy Performance Assessment

This section contains a series of questions that can be used to help assess whether the monitoring program and remediation systems O&M should be adjusted.

1. Monitoring Program

Describe changes to the monitoring program that have been made since the last time you completed the O&M checklist for this remedy component.	
Are the baseline data and post-remedy data adequate to perform statistical comparisons and evaluate remedy performance? If no, what actions have been or are being taken in response?	☐ Yes ☐ No

Is high variability in the data interfering with or preventing a meaningful interpretation of the data?	☐ Yes ☐ No
If yes, could this situation be mitigated by increasing the density or frequency of data collection? Use this space to comment.	☐ Yes ☐ No
Based on changes in contamination or field conditions (see A.2 of this appendix), is there reason to modify the monitoring program? If yes, describe changes to the monitoring program that are most necessary.	☐ Yes ☐ No
Has the adequacy/redundancy and cost-effectiveness of the monitoring program been evaluated, including evaluation of sampling locations, frequency, sampling and analytical methods, monitoring parameters, and test methods? Use this space to comment.	☐ Yes ☐ No
Is there reason to modify the monitoring program to address inadequacies, remove redundancies, and/or improve its cost-effectiveness? If yes, describe changes to the monitoring program that would likely have the greatest impact.	☐ Yes ☐ No
Do you have adequate documentation (e.g., good quality O&M reports) and tools (e.g., software) to effectively manage and interpret monitoring data? If no, please explain how documentation and/or tools could be improved.	☐ Yes ☐ No
2. System Operations	
Describe changes to system operations that have been made since the last time you completed the O&M checklist for this remedy component.	
Is (are) the remedial system(s) covered under this appendix performing as expected relative to the remediation milestones and goal(s)? If no, what actions have been or are being taken in response?	☐ Yes ☐ No
Do monitoring data indicate trends/patterns that are consistent with remedial design expectations? If no, what actions have been or are being taken in response?	☐ Yes ☐ No
Based on observations regarding contamination or field conditions (see A.2 of this appendix and previous questions in this section), is there reason to modify systems operations to improve remedy performance? If yes, describe changes to system operations that are most necessary.	☐ Yes ☐ No
Has an optimization study been conducted for the remedy/remedy component(s)? Use this space to comment.	☐ Yes ☐ No
Has the downtime associated with non-routine operations and maintenance exceeded expectations? If yes, what actions have been or are being taken to minimize downtime?	☐ Yes ☐ No
Based on optimization and downtime considerations, is there reason to modify systems operations to improve remedy performance? If yes, describe changes to system operations that are most necessary.	☐ Yes ☐ No
3. Maintenance	
Are routine maintenance activities adequate to ensure the reliable operation of the remedial system(s)? If no, what changes to the maintenance program are most necessary?	☐ Yes ☐ No

Have any major repairs to the remedial system(s) been required since the last time you completed the O&M checklist for this remedy/remedy component? If yes, describe the repairs, their impact on progress toward remediation milestones, and actions taken to minimize similar repairs in the future.	☐ Yes ☐ No
C. Cost Effectiveness	
Does information collected since the last O&M review suggest opportunities to reduce costs associated with equipment operations and maintenance? If yes, use this space to comment.	☐ Yes ☐ No
Does information collected since the last O&M review suggest opportunities to reduce costs associated with the monitoring program? If yes, use this space to comment.	☐ Yes ☐ No
D. Remedial Decisions: Indicate which of the following remedial decisions is appropriate at the present time and provide the basis for the decision.	
☐ No Change ☐ Modify/Optimize System ☐ Modify/Optimize Monitoring Program ☐ Modify ICs ☐ Implement Contingency/Alternative Remedy	
Basis for decision:	

Appendix D

Best Management Practices Manual

Libby Asbestos Superfund Site – Operable Unit 5

Best Management Practices Manual

This document has been prepared to outline best management practices (BMPs) for those involved in activities (e.g. OU5 landowners and their employees, utility workers, contractors, and subcontractors doing work on properties within OU5) working within the Environmental Protection Agency (EPA) Libby Asbestos Superfund Site, operable unit 5 (OU5). Discussion of the contaminant of concern (COC), BMPs, and where to find additional information pertaining to OU5, including, previous response actions, investigations, institutional controls (ICs), and the Site-wide Human Health Risk Assessment are provided within this document.

Contents

Section 1 Introduction

Libby amphibole asbestos (LA)-containing vermiculite and vermiculite products were transported using the railroad spur at OU5 (Figure 1-1), and vermiculite products previously were stockpiled on native soil at the former Expansion Plant. The railroad spur was used for shipping raw and processed vermiculite material to and from the mill. Vermiculite insulation was installed in buildings (central maintenance building, finger jointer, and the plywood plant) and all accessible material has since been removed. Furthermore, there has been extensive soil sampling and removal of contaminated soil within OU5 (EPA 2015).

Numerous hard rock mines have operated in the Libby area since the 1880s, but the dominant impact to human health and the environment in the City of Libby has been from vermiculite mining and processing. The vermiculite deposit that was mined by W.R. Grace (Grace) contains a distinct form of naturally occurring amphibole asbestos, LA, which is considered the COC at the Libby Asbestos Superfund Site. EPA initiated an emergency response action in November 1999 to address questions and concerns raised by citizens of the City of Libby regarding possible ongoing exposures to asbestos fibers as a result of historical mining, processing, and exportation of asbestos-containing vermiculite.

1.1 Contaminant of Concern

As previously stated, the COC for the site is LA. Asbestos fibers are odorless and tasteless and vary in length, structure, and chemical composition. Fibers are microscopic and environmentally persistent. They do not evaporate, burn, or dry out from heat or degrade in water. The toxicity of different types of asbestos fibers varies, but chronic and acute exposure to any one of them potentially can be fatal. While some chrysotile asbestos is likely present, it is not due to Site-related contamination and is not considered a COC. EPA actions at the Site have not focused on the removal of chrysotile or other forms of asbestos, only LA (EPA 2015).

Section 2 Best Management Practices

For the purposes of this document, BMPs are defined as means and methods when used in combination of developed ICs, provide guidance to owners, land users, tenants, and visitors for the prevention or reduction in the release and exposure to LA within OU5. The information within this section is grouped by the type of activities anticipated to take place in OU5 which could cause a release and potential exposure to LA.

2.1 Housekeeping

Housekeeping is defined as activities such as cleaning, routine maintenance of facilities, buildings or grounds on the property. The following BMPs are grouped by indoor (e.g., cleaning, indoor maintenance) and exterior (e.g., mowing, surveying, equipment storage) types of activities.

BMP Guidance

Indoors

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Maintain a clean building by periodically cleaning with a high-efficiency particulate air (HEPA) filtered vacuum. Follow manufacturers instructions on how and when to change out bags and filters.
3. Avoid sweeping with a broom during maintenance activities. Utilize a mop and water or wet methods to clean horizontal surfaces.
4. Notify the property owner if suspected LA material is encountered during housekeeping activities.
5. See Attachment 1 for additional information and guidance regarding BMPs

Outdoors

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Ensure equipment is stored on clean surfaces or free from areas where detectable levels of LA are documented to remain at ground surface.
3. When conducting mowing activities, attempt to mow when the area is damp or small amounts of moisture are present to minimize dust generation.
4. Clean and rinse tools after use and prior to storage
5. Attempt to keep soles of shoes clean after working outdoors and prior to entering buildings, vehicles, or heavy equipment.
6. Notify the property owner if suspected LA material is encountered during housekeeping activities.
7. See Attachment 1 for additional information and guidance regarding BMPs

2.2 Building Renovation

Building renovation includes, but is not limited to, any alterations, additions, or improvements to the interior or exterior of buildings or structures located on the property. Scale of renovation is not limited by financial or size of renovation and includes any protrusion into any existing wall system, removal of any wall surfacing material, or removal of any complete or partial wall systems currently in place.

BMP Guidance

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Recourses section of this document.
2. Notify the property owner well in advance and in writing of any known plans to conduct building renovations. Do not attempt to conduct renovations without prior notification or consent from the property owner.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
4. Notify the property owner or entity responsible for operation and maintenance (O&M) if suspected LA materials are encountered during renovation. Seal off the area with appropriate materials (i.e., poly sheeting).
5. During any renovation utilize point-of-cut ventilation (POCV) techniques with a HEPA vacuum at point of access and/or wet methods when cutting into any material to minimize dust generation, migration and exposure.
6. Do not attempt to vacuum known or suspected LA contaminated material without a device which contains a HEPA filter system.
7. Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.
8. See Attachment 1 for additional information and guidance regarding BMPs

2.3 Building Demolition

Building demolition is defined by any complete or partial removal, destruction, or dismantling of any building or structure.

BMP Guidance

Before Demolition

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Notify the property owner well in advance and in writing of any known plans to conduct building demolition. Do not attempt to conduct demolition without prior notification or consent from the property owner.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
4. Check local, state and federal regulations regarding demolition of buildings.
5. Check with the local landfill to learn if inspection of your debris is required.
6. The entity performing demolition should develop a contingency plan for cases where contamination is encountered during activities.
7. The entity performing demolition should arrange for offsite disposal of any materials prior to beginning demolition activities.
8. Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.
9. See Attachment 1 for additional information and guidance regarding BMPs

During and After Demolition

1. Wet building, structure, or area prior to and during demolition; there should be no offsite migration of dust during demolition activities.
2. If a change of condition occurs whereby LA contaminated material is observed, contact the property owner or entity responsible for O&M for advice on how to manage the material.
3. Keep contaminated material encountered during activities wet.
4. Keep all debris wet and covered with a tarp during transportation.
5. Dispose of debris according to local, state, and federal laws.

2.4 Excavation

Excavation for the purpose of this document refers to any action of cutting, digging, or scooping soil, debris, or other materials from the ground surface or below.

BMP Guidance

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Notify the property owner well in advance and in writing of any known plans to conduct excavation activities. Do not attempt to conduct excavation activities without prior notification or consent from the property owner.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
4. Notify the Montana One-call (U-Dig) utility locate service prior to any excavation activity. Do not attempt to excavate any area prior to all utilities having been marked.
5. When excavating, keep soil, debris, or other materials wet during work to minimize dust migration or potential exposure to LA.
6. Wear protective clothing while performing excavation activities (i.e., appropriate disposable protective clothing, gloves, and booties. Dispose of protective clothing appropriately.
7. Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.
8. If a change of condition occurs whereby LA contaminated material is observed, contact the property owner or entity responsible for operation and maintenance (O&M) for advice on how to manage the material.
9. See details regarding importing and exporting of materials Section 2.6 and 2.7.
10. See Attachment 1 for additional information and guidance regarding BMPs

2.5 New Construction Projects

The following lists BMPs for any new construction projects planned by either the owner, tenant, or contractor involved in the overall construction of any new area located within OU5. New construction refers to any site preparation for and construction of entirely new areas, new buildings, or new structures on the site which would cause a change of condition to the ground surface, regardless of size or scale.

BMP Guidance

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Notify the property owner well in advance and in writing of any known plans to conduct any new construction project. Do not attempt to conduct any new construction project without prior notification or consent from the property owner.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
4. The entity performing new construction projects should develop a contingency plan for cases where contamination is encountered during activities.
5. Follow BMPs for importing and exporting of materials Section 2.6 and 2.7.
6. See Attachment 1 for additional information and guidance regarding BMPs

2.6 Importing of Materials

Importing of materials refers to the hauling or transporting of any material for use, placement or disposal within the boundary of OU5. Materials include, but are not limited to, soil, rock, mulch, organic or non-organic debris, or building materials.

BMP Guidance

1. The property owner or entity responsible for maintaining control of the site should have a system in place to ensure importation of any materials does not have the potential to increase risk of LA exposure to land users. This may be satisfied through the use of a site management plan.
2. Any entity importing materials shall notify the property owner when importing materials to the site either through written documentation or in person. Entity shall make available any documentation confirming importation of materials will not have the potential to increase the risk of LA exposure or impact any protective remedy in place on the site.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.

2.7 Exporting of Materials

Exporting of materials refers to the hauling or transporting of any material for use, placement or disposal from OU5 to another location. Materials include, but are not limited to, soil, rock, mulch, organic or non-organic debris, or building materials.

BMP Guidance

1. The property owner or entity responsible for maintaining control of the site should have a system in place to ensure exportation of any materials does not have the potential to increase risk of LA exposure to areas outside of OU5. This may be satisfied through the use of a site management plan.
2. Any entity exporting materials should notify the property owner when exporting materials from the site either through written documentation or in person. Entities should make available any documentation confirming exportation of materials will not have the potential to increase the risk of LA exposure or impact any protective remedy in locations outside of OU5.
3. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
4. Check local, state and federal regulations regarding disposal or transportation of material.

2.8 Recreational Activities

For the purposes of this document, recreation is defined as, any activity occurring on the site by individuals for enjoyment, relaxation, or exercise. Recreation includes, but is not limited to, walking, jogging, bike riding, motoX activities, and fishing.

BMP Guidance

1. Obtain most current information on where contamination was removed or may remain. This information will be available from EPA developed documents as listed within the Additional Information and Resources section of this document.
2. Review IC plan for the site to ensure any listed proprietary controls, government controls, enforcement tools, or informational devices have been adhered to prior to conducting work.
3. Notify the property owner or entity responsible for O&M if suspected LA materials are encountered during recreation activities. Report unauthorized or suspected illegal activity to the property owner or proper authorities.

Section 3 Additional Information and Resources

The following resources are available to provide information to property owners, tenants, land users, or visitors while conducting activities within OU5.

Record of Decision for Libby Asbestos Superfund Site (EPA 2015b)
This document discusses the final decision and explains the remediation plan at the end of the detailed investigation and evaluation of conditions at the Site.

Site-Wide Human Health Risk Assessment – Libby Asbestos Superfund Site (EPA 2015a)
The purpose of this document is to quantify potential human health risks from exposures to LA at the Site under current and future conditions. Results of this risk assessment are intended to help Site managers determine if past removal actions have been sufficient to mitigate risk, if additional remedial actions are necessary to address risks, and if so, which exposure scenarios would need to be addressed in future remedial actions.

Remedial Investigation Report – Operable Unit 5 (HDR 2013)
This document describes the nature and extent of LA at OU5, focused primarily on investigative measures taken on the site to characterize the level of contamination.

Remedial Action Report – Operable Unit 5 (CDM Smith 2016a)
This document details the remedial actions and activities that have taken place at OU5.

Institutional Control Implementation and Assurance Plan – Operable Unit 5 (CDM Smith 2016b)
This document identifies activities that are designed to implement, maintain, and enforce ICs at OU5, and the organizations responsible for conducting these activities.

Operation and Maintenance Plan – Operable Unit 5 (CDM Smith 2016c)
This document presents the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining at OU5.

Libby - EPA Information Center
108 E 9th St
Libby, MT 59923
(406) 293-6194

Asbestos Resource Program
418 Mineral Ave
Libby, MT 59923
(406) 291-5335
www.LCARP.com

The EPA Libby Asbestos Superfund Site website
http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0801744

Additional federal and state websites with information to assist with the managing of asbestos
https://www.epa.gov/asbestos/building-owners-and-managers

https://www.epa.gov/superfund/asbestos-superfund-sites

https://www.osha.gov/SLTC/asbestos/

http://deq.mt.gov/Public/asbestos

Section 4 References

CDM Smith. 2016a. *Final Remedial Action Report, Operable Unit 5 – Former Stimson Lumber Mill*, Libby Asbestos Superfund Site, Lincoln County, Montana. January.

_____. 2016b. *The Former Stimson Lumber Mill Export, Operable Unit 5, Institutional Control Implementation and Assurance Plan,* Libby Asbestos Superfund Site. Libby Montana. Revision 0, January.

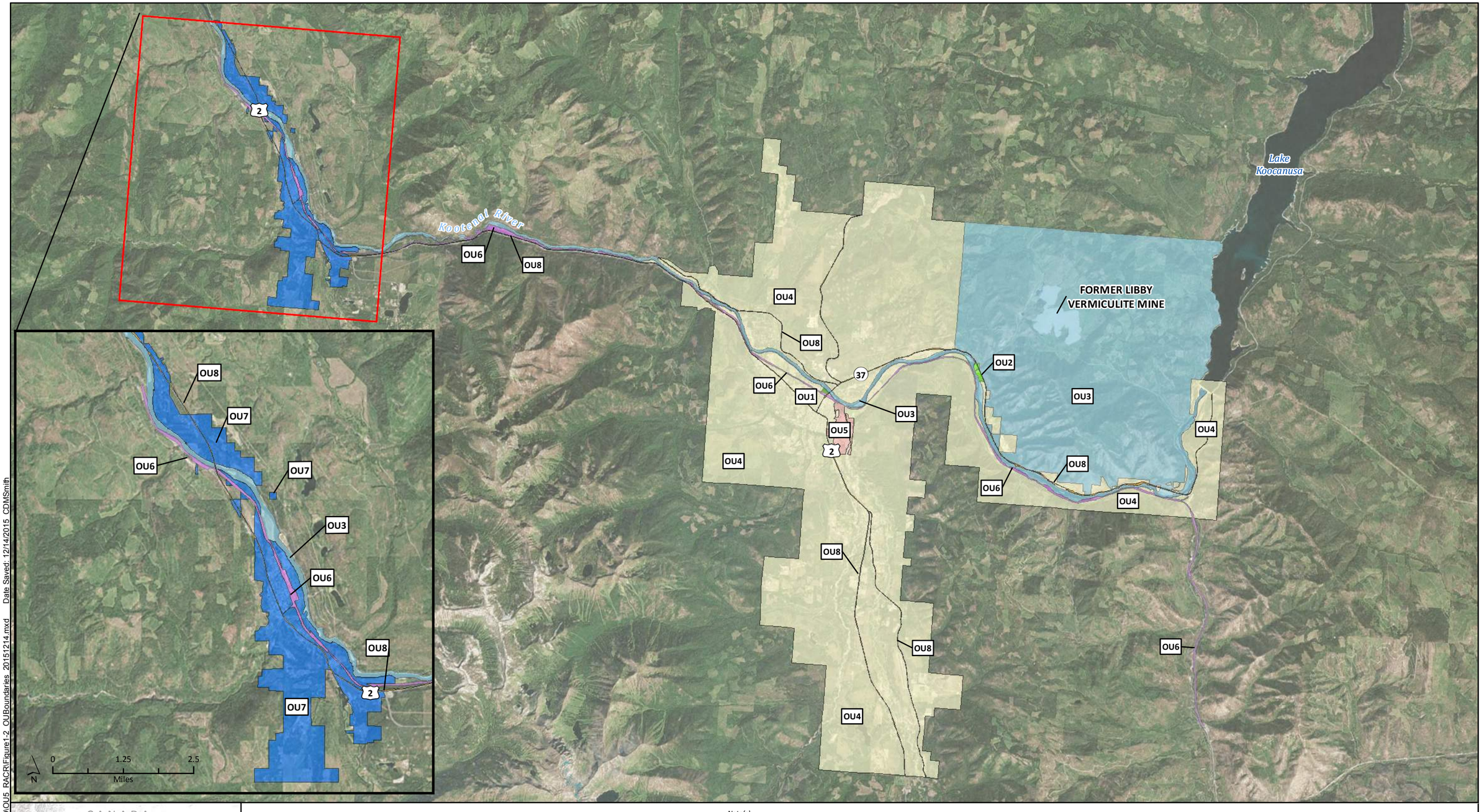
_____. 2016c*. Operations and Maintenance Plan, Former Stimson Lumber Mill,* Operable Unit 5, Libby Asbestos Superfund Site, Lincoln County, Montana, January.

EPA. 2015a. *Final Site-wide Human Health Risk Assessment*, Libby Asbestos Superfund Site, Libby, Montana. November.

_____. 2015b. *Record of Decision for Libby Asbestos Superfund Site, Libby and Troy Residential and Commercial Properties, Parks and Schools, Transportation Corridors, Industrial Park. Operable Units 4-8*, Lincoln County, Montana. December.

HDR. 2013. *Final Remedial Investigation Report, Operable Unit 5*, Libby Asbestos National Priorities List Site, Libby Montana. June.

Figure 1-1



- OU1 - Former Export Plant
- OU2 - Former Screening Plant
- OU3 - Former Libby Vermiculite Mine
- OU4 - Residential/Commercial Areas within Libby
- OU5 - Former Stimson Lumber Mill
- OU6 - Burlington Northern and Santa Fe Railroad
- OU7 - Residential/Commercial Areas within Troy
- OU8 - Highways

Note(s):
1. EPA established the preliminary study area boundary for the purposes of planning and developing the scope of the Remedial Investigation/Feasibility Study (RI/FS) for OU3. This study area boundary may be revised as data are obtained during the RI for OU3 on the nature and extent of environmental contamination associated with releases that may have occurred from the mine site. The final boundary of OU3 will be defined by the final EPA-approved RI/FS.

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Sources: Esri, USGS, NOAA
Road and Railroad Source: US Census Tiger/Line
Waterways and Waterbodies Source: National Hydrography Dataset - USGS

Figure 1-1

Operable Unit Boundaries

Libby Asbestos Superfund Site | Lincoln County, MT

CDM Smith

Document Path: R:\GIS Support\MXD\OU5 RACR\Figure1-2 OUBoundaries 20151214.mxd Date Saved: 12/14/2015 CDMSmith

Attachment 1

Reducing Asbestos Exposure

Libby Amphibole Asbestos

Libby amphibole asbestos (LA) is a naturally occurring mineral but should be handled with extreme care. Exposure to LA can lead to serious asbestos-related diseases, such as asbestosis, lung cancer or mesothelioma.

The health risk from exposure to all asbestos depends greatly on the amount of asbestos in the material you are disturbing and length of time that exposure lasts; therefore, precautions should be exercised to limit asbestos exposures.

Vermiculite

Vermiculite was mined in Libby, MT and was commonly used in and around homes in Lincoln County for a variety of reasons, including as a soil additive, construction aggregate and attic insulation. If vermiculite is present, it may contain LA.

If you encounter vermiculite on your property, it is possible that it is contaminated with asbestos. The disturbance of vermiculite that is contaminated with asbestos may cause the LA to become airborne. **Cover or wet the vermiculite and call the ARP Hotline**. The ARP will help determine if the vermiculite is contaminated with LA.

You may come into contact with asbestos on your property even if the EPA has investigated the property or completed a removal.

High efficiency particulate air, **HEPA**, filter vacuums are effective for asbestos containing vermiculite insulation. Never vacuum vermiculite with a regular vacuum. Also, use a HEPA vacuum for household cleaning and to remove dust from inaccessible areas, such as under carpets, appliances or furniture.

EDUCATION • RESOURCES • INITIATIVES
LINCOLN COUNTY ARP
ASBESTOS RESOURCE PROGRAM

ARP Hotline – 406-291-5335

Call if you plan to remodel, demolish, excavate OR if you find vermiculite on your property. The Asbestos Resource Program (ARP) will send personnel out to inspect the situation, provide information, and make recommendations. The ARP may also serve as a liaison during those activities.

You may come into contact with Libby amphibole asbestos during:

Renovating – removing old carpets or drywall, installing ceiling fans or removing wall outlets, taking down walls, putting in windows

Routine landscaping – gardening, rototilling or mowing

Extensive digging – septic systems, sprinklers or water lines

Should I be worried about asbestos if the EPA has already been to my property?

Even though the EPA has visited your property, you could still come into contact with asbestos.

Call the ARP for more information on the investigation and removal activities completed by the EPA and for details about the asbestos that may remain on your property.

REMEMBER, regular dust masks are not effective in reducing exposure to LA.

Reducing Asbestos Exposure

Vermiculite in soil

Processed vermiculite often seen as insulation.

Additional Resources

Lincoln County Asbestos Resource Program
418 Mineral Avenue
Libby, MT 59923
406-283-2442
www.lcarp.org

United States
Environmental Protection Agency
Information Center
108 E. 9th St
Libby, MT 59923
406-293-6194
www2.epa.gov/region8/libby-asbestos

Montana
Department of Environmental Quality
Asbestos Control Program
406-444-5300

Steps to take while renovating or demolishing:

- **Do** contact the ARP Hotline before renovating or demolishing.
- **Do** check local, state and federal regulations regarding renovation and demolition of buildings.
- **Do** use point-of-cut ventilation techniques when pulling, cutting or accessing behind boards or wall coverings.
- **Do** use a HEPA vacuum at the point of access or disturbance to minimize dust migration and lessen potential exposure.

Demolition:

- **Do** use water to moisten the area being demolished to minimize dust.
- **Do** rinse off any equipment within the work area.
- **Do** keep all debris wet and covered with a tarp during transportation.
- **Do** dispose of debris according to local, state and federal laws including landfill specific requirements.

Steps to take while working outside of your home:

- **Do** water your lawn often, a healthy lawn reduces dust.
- **Do** rinse gardening tools outside within your work area after every use.
- **Do** wipe your feet and/or take your shoes off at the door and leave them outside, if possible. Try not to bring any contaminated clothing or material back inside.
- **Do** wash your hands outdoors after any yard work, if possible.
- **Do not** disturb areas where you can see vermiculite. If it is a place you intend to work in, cover the vermiculite and call the ARP Hotline.
- **Do not** dig, cultivate, mow, rake or rototill your yard or garden when it is dry and dusty.
- **Do not** bring dusty or dirty things inside.

CALL THE ARP HOTLINE IF YOU SEE ANY VERMICULITE ON YOUR PROPERTY, EVEN IF YOU ARE UNSURE.

Contractors & Tradesmen Working Indoors

What To Do If You Find Vermiculite and Asbestos In A Home or Business

Lincoln County Asbestos Resource Program (ARP) – (406) 291-5335
EPA Information Center— 108 E. 9th Street, Libby, MT 59923— (406) 293-6194

Revised: January 2014

Vermiculite in Libby & Troy

For several decades, vermiculite was commonly used in and around homes in Lincoln County for a variety of applications, including as a soil additive, construction aggregate, and attic insulation.

If vermiculite is present, it might contain Libby Amphibole (LA) asbestos which is toxic. Exposure to LA could lead to such serious diseases as asbestosis, lung cancer, or mesothelioma. It will take several years for EPA to complete its cleanup, and workers might encounter vermiculite during that time and even after EPA has finished its work. It is not possible for EPA to remove (or to even know about) *all* the vermiculite in the area. In some cases, vermiculite might be intentionally left in sealed walls, home foundations, and other relatively inaccessible areas. Remodeling, repair, electrical, or plumbing work might uncover vermiculite that was otherwise sealed in place. **Always ask the homeowner if they know where you might find vermiculite.**

It is possible that you might unexpectedly find vermiculite after starting your work, perhaps by cutting into a wall (drill a pilot test hole first) or uncovering something that EPA or the homeowner did not know about. **EPA strongly cautions you not to work with vermiculite or disturb it any way.**

Improper work practices can contaminate the interior of the home or building where you are working! It is your responsibility to know the state and local laws and regulations.

Raw and Popped Vermiculite Ore

Precautionary Steps to Take So You Can Get On With Your Job

If you encounter vermiculite, it is likely that you will be exposed to Libby Amphibole asbestos. If you choose to continue working, take the following minimal steps:

1. **Always notify the resident**. If they haven't already told you about it, they might not know.

2. **For very small quantities, such as a handful, or if you are unsure as to whether it's vermiculite or not,** you can call the **Asbestos Resource Program (ARP).** If you do not want to call the ARP, as a precaution, use a damp paper towel to scoop up the material into a sealable plastic bag or jar. Then use another damp towel to wipe down the area. Place the used paper towels in the container and throw everything away in a proper receptacle (a covered trash can is OK).

3. **Never vacuum vermiculite with a regular vacuum**. HEPA filter vacuums are effective on small quantities of vermiculite. Residents who have had a cleanup done should have a HEPA vacuum. If you do not have access to a HEPA vacuum, call the EPA Information Center.

4. **For larger quantities, such as what you might find in a breached wall, or if you are unsure as to whether it's vermiculite or not,** do not disturb the material. Do not vacuum large amounts of vermiculite - even with a HEPA vacuum. Isolate and cover the area and **call the ARP immediately**.

5. **No matter the volume or location of known or suspected vermiculite, contact the ARP** Please notify the ARP early to protect yourself and your workers and to ensure the most appropriate action is taken.

Libby Asbestos is toxic. It should be avoided or handled with extreme care. Exposure to Libby Amphibole asbestos has resulted in disease in workers and non-workers who have had contact with contaminated materials. Take care not to bring any contaminated clothing or material back to your home or business. Treat any asbestos containing material as regulated material and comply with all state and local regulations. The health risk from exposure to **all** asbestos depends greatly on the amount of asbestos in the material you are disturbing and how long the exposure lasts. **There is no known threshold risk level for asbestos-related materials, and any exposure will increase the risk of asbestos-related disease.** If you take the basic precautions outlined in this fact sheet, your risk from exposure will be less.

Who Can I Contact With Questions About Asbestos?

Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.

EPA Information Center— (406) 293-6194
ARP— (406) 291-5335

The EPA, the ARP, or DEQ might send personnel out to inspect a situation involving vermiculite or LA. That guidance might include advising the owner to allow EPA or a licensed asbestos contractor or inspector to take samples, conduct cleanup, or take other special measures to reduce the risk of asbestos exposure. A list of licensed contractors and inspectors can be found at the Information Centers.

Montana Department of Environmental Quality—Asbestos Control Program
(406) 444-5300

Montana law requires that employers hire a licensed inspector to determine if asbestos is present before doing any work. Asbestos that is not associated with the Libby vermiculite mine is still regulated by the Montana DEQ. If non-Libby asbestos is found, it should be dealt with according to Montana regulations. Explore Montana DEQ's Asbestos web site at: **www.deq.mt.gov/Asbestos**

Please learn about the risks of asbestos exposure and basic precautions by reviewing the fact sheets available at the EPA **Information Center** or the website listed below:

- **HEPA Vacuum Cleaner Program** – *Revised January, 2014*. Provides information on the effectiveness of HEPA vacuums and describes their role in Libby's cleanup.
- **Lincoln County Do-It-Yourselfers** – *Revised January, 2014.*
- **Contractors & Tradesmen Working Outdoors** – *Revised January, 2014.*
- **Demolition Activities** – Revised *January, 2014.*
- **Libby and Troy Residents: Vermiculite or Asbestos In or Around Your Home or Business** – *Revised*
- *January, 2014*
- **Yard Work and Gardening Activities** – *Revised July 2013*

Explore the EPA web site and its links at: http://www2.epa.gov/region8/libby-asbestos

Contractors & Tradesmen Working Outdoors

What To Do If You Find Vermiculite and Asbestos Around A Home or Business

Lincoln County Asbestos Resource Program (ARP) – Libby (406) 291-5335
EPA Information Center— 108 E. 9th Street, Libby, MT 59923— (406) 293-6194

Revised January 2014

Vermiculite in Libby

For several decades, vermiculite was commonly used in and around homes in Lincoln County for a variety of applications, including as a soil additive, construction aggregate, and attic insulation.

If vermiculite is present, it might contain Libby Amphibole asbestos (LA). Exposure to LA could lead to such serious diseases as asbestosis, lung cancer, and mesothelioma. It will take several years for EPA to complete the cleanup, and workers might encounter vermiculite during that time and even after EPA has finished its work. It is not possible for EPA to remove (or to even know about) *all* the vermiculite in the area. In some cases, vermiculite might be intentionally left in sealed walls, home foundations, and other relatively inaccessible areas. Construction, remodelling, or landscaping involving digging might uncover vermiculite either before or after EPA cleans the property.

Always ask the homeowner if they know where buried vermiculite might be. EPA might have information on the property based on the investigation, design, and cleanup that has been completed. When calling EPA, you will need to provide the address, location of the work, and the likely depth of excavation.

It is possible that you might unexpectedly find vermiculite after starting your work, perhaps by uncovering it while doing any major outdoor project. EPA strongly cautions you not to disturb it in any way that might cause LA to become airborne.

Precautionary Steps to Take So You Can Get On With Your Job

If you encounter vermiculite, it is likely that you will be exposed to Libby Amphibole asbestos. If you choose to continue working, take the following minimal steps:

1. **Always notify the resident**. If they haven't already told you about it, they might not know.

2. **Stop work to assess the volume** of vermiculite. Cover or wet down the material, if possible.

3. **For very small quantities** of vermiculite, such as handful, EPA recommends you wet the area and contact the **Asbestos Resource Program (ARP) for appropriate evaluation and possible removal. If possible, leave it alone.** If the material is buried, leave it there. It's better to have it buried than at the surface.

4. **For larger quantities** of vermiculite such as when it was used as fill around pipes, around other structures, or as bulk fill (you may have sparkling soil) **do not to disturb the material – call the Asbestos Resource Program (ARP) immediately.**

5. **No matter the volume or location of known or suspected vermiculite, contact the ARP. Lincoln County, and EPA are considering a formal notification requirement. Please notify us early to protect yourself and your workers and to ensure the most appropriate action is taken.**

Raw and Popped Vermiculite Ore

Libby Asbestos is toxic. It should be avoided or handled with extreme care. Exposure to Libby Amphibole asbestos has resulted in disease in workers and non-workers who have had contact with contaminated materials. Take care not to bring any contaminated clothing or material back to your home or business. Treat any asbestos containing material as regulated material and comply with all state and local regulations. The health risk from exposure to **all** asbestos depends greatly on the amount of asbestos in the material you are disturbing and how long the exposure lasts. **There is no known threshold risk level for asbestos-related materials, and any exposure will increase the risk of asbestos-related disease.** If you take the basic precautions outlined in this fact sheet, your risk from exposure will be much less.

Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.

Who Can I Contact With Questions About Asbestos?

EPA Information Center— (406) 293-6194
ARP— (406) 291-5335

The EPA, the ARP, or DEQ might send personnel out to inspect a situation involving vermiculite or LA. That guidance might include advising the owner to allow EPA or a licensed asbestos contractor or inspector to take samples, conduct cleanup, or take other special measures to reduce the risk of asbestos exposure. A list of licensed contractors and inspectors can be found at the Information Centers.

Montana Department of Environmental Quality—Asbestos Control Program
(406) 444-5300

Montana law requires that employers hire a licensed inspector to determine if asbestos is present before doing any work. Asbestos that is not associated with the Libby vermiculite mine is still regulated by the Montana DEQ. If non-Libby asbestos is found, it should be dealt with according to Montana regulations. Explore Montana DEQ's Asbestos web site at: **www.deq.mt.gov/Asbestos**

Please learn about the risks of asbestos exposure and basic precautions by reviewing the fact sheets available at the **Information Centers** or the website listed below:

- **HEPA Vacuum Cleaner Program** – *January 2014*. Provides information on the effectiveness of HEPA vacuums and describes their role in Libby's cleanup.
- **Lincoln County Do-It-Yourselfers** – *Revised January 2014*
- **Contractors & Tradesmen Working Indoors** – *Revised January 2014*
- **Demolition Activities** – *January 2014*
- **Libby and Troy Residents: Vermiculite or Asbestos In or Around Your Home or Business** – *Revised January 2014*
- **Yard Work and Gardening Activities** – *January 2014*

Explore the EPA web site and its links at: http://www2.epa.gov/region8/libby-asbestos

Demolition Activities

What To Do If You Are Tearing Down Structures That Contain Vermiculite or Asbestos

Lincoln County Asbestos Resource Program (ARP); Libby and Surrounding Area – (406) 291-5335
EPA Information Center - 108 E. 9th St.; Libby, MT 59923 - (406) 293-6194

Revised: January 2014

Vermiculite In Libby & Troy

Raw and Popped Ore

For several decades, vermiculite was commonly used in and around homes in Lincoln County for a variety of applications, including as a soil additive, construction aggregate, and attic insulation.

If vermiculite is present, it might contain Libby Amphibole asbestos (LA). Exposure to LA could lead to serious diseases such as asbestosis, lung cancer, and mesothelioma. It will take several more years for EPA to complete the cleanup, and workers might encounter vermiculite during that time or even after EPA has finished its work. It is not possible for EPA to remove (or to even know about) *all* the vermiculite in the area. In some cases, vermiculite might be intentionally left in sealed walls, home foundations, and other relatively inaccessible areas. Demolition of any existing structure in the Libby/Troy area might uncover vermiculite either before or after EPA has completed its work.

It is possible that you might unexpectedly find vermiculite after starting your demolition project. EPA strongly cautions you not to disturb it in any way that might cause LA to become airborne.

Precautionary Steps To Take So You Can Get On With Your Job

Before Demolition:

1. **Contact the Asbestos Resource Program (ARP) for a free assessment of the situation.**
2. Check **local, state and federal regulations** regarding demolition of buildings.
3. Check with the local landfill to learn if inspection of your debris is required.

During Demolition:

1. **Use water to moisten the area being demolished to minimize dust generation.** There should be no offsite migration of dust during demolition activities.
2. **Stop work to assess the volume** of vermiculite. Call the ERS immediately if something unusual is encountered.
3. **Utilize point-of-cut ventilation techniques** when pulling, cutting, or accessing behind boards or wall coverings, use a HEPA vacuum at the point of access or disturbance to minimize dust migration to lessen potential exposure.
4. **For a small quantity** of vermiculite, such as a very isolated area or a few random flakes, EPA recommends you wet and place it in a sealable plastic bag (remember to rinse any tools used to transfer vermiculite) and put the bag in the trash.

After Demolition:

1. **Keep larger quantities of vermiculite wet** – vermiculite that was used as fill around pipes, in walls, as bulk fill, etc.
2. Keep all debris wet and covered with a tarp during transportation.
3. Dispose of debris according to local, state, and federal laws.

Libby Amphibole asbestos (LA) should be avoided or handled with extreme care. Exposure to LA has resulted in disease in workers and non-workers who have had contact with contaminated materials. Take care not to bring any contaminated clothing or material back to your home or business. Treat any asbestos containing material as regulated material and comply with all state and local regulations. There is no known threshold risk level for asbestos-related materials, and any exposure will increase the risk of asbestos-related disease. The health risk from exposure to **all** asbestos depends greatly on the amount of asbestos in the material you are disturbing and how long the exposure lasts. If you take the basic precautions outlined in this fact sheet, your project will be completed with minimal exposure to LA.

Common dust or surgical masks are not effective against asbestos fibers! Wearing a respirator with a HEPA filter is the best way to avoid breathing asbestos fibers. However, they must be used properly or exposure may still occur. For information on respirator requirements, visit OSHA's website: www.osha.gov/SLTC/respiratoryprotection.

Who Can I Contact With Questions About Asbestos?

EPA Information Center - (406) 293-6194
ARP for the Libby area – (406) 291-5335

EPA, the ARP, or DEQ may send personnel out to inspect a situation involving vermiculite or LA. They might advise the owner to allow EPA or a licensed asbestos contractor or inspector to take samples, conduct cleanup, or take other special measures to reduce the risk of asbestos exposure. A list of licensed inspectors and contractors can be found at the Information Centers.

Montana Department of Environmental Quality - Asbestos Control Program (406) 444-5300

Montana law requires that employers hire a licensed inspector to determine if asbestos is present before doing any work. Asbestos that is not associated with the Libby vermiculite mine is still regulated by Montana DEQ. If non-Libby asbestos is found, it should be dealt with according to Montana regulations. Visit Montana DEQ's Asbestos web site at: **www.deq.mt.gov/Asbestos**

Please learn about the risks of asbestos exposure and basic precautions by reviewing the fact sheets available at the **Information Centers** or the website listed below:

- **HEPA Vacuum Cleaner Program** – *Revised January 2014*. Provides information on the effectiveness of HEPA vacuums and describes their role in Libby's cleanup.
- **Lincoln County Do-It-Yourselfers** – *Revised January 2014*
- **Contractors & Tradesmen Working Indoors** – *Revised January 2014*
- **Contractors & Tradesmen Working Outdoors** – *Revised January 2014*
- **Libby and Troy Residents: Vermiculite or Asbestos In or Around Your Home or Business** – *Revised January 2014*
- **Yard Work and Gardening Activities** – Revised *January 2014*
- **Explore the EPA web site and its links at: http://www2.epa.gov/region8/libby-asbestos**

Libby and Troy Residents

Vermiculite or Asbestos
In or Around Your Home or Business

EPA Information Center • 108 E. 9th Street, Libby, MT 59923 • 406-293-6194
Lincoln County Asbestos Resource Program (ARP) • 406-291-5335

Revised: January 2014

Vermiculite in Libby & Troy

Vermiculite was used in a variety of forms for decades in and around Libby homes as a soil additive, a lightweight aggregate for concrete, and attic insulation, among other things.

If vermiculite is present, it may contain Libby asbestos. It will take several years to complete the cleanup and people may encounter vermiculite during that time. Vermiculite will continue to be discovered from time to time long into the future and even after cleanup by the EPA. It is not possible for EPA to remove all the contaminated vermiculite. Vermiculite may be left in sealed walls, home foundations, and other relatively inaccessible areas.

Some encounters with vermiculite will be small and may include:

- **minor renovations –** removing old carpets, installing ceiling fans, or removing wall outlets
- **minor landscaping –** replacing bedding for plants and mowing

There will be times when a large pocket of vermiculite is discovered. Such situations may include:

- **intrusive digging** – septic systems, sprinklers, and water lines.
- **major renovations –** taking walls down, putting in windows, etc.
- **fires –** fire-fighting and subsequent cleanup.

Protect Yourself

Hiring a licensed asbestos contractor to clean up vermiculite spilled while doing home improvements is recommended to minimize your exposure.

Take Steps to Avoid Exposure

1. For a small quantity, such as a handful of vermiculite, wet wipe it and throw it away. For a small quantity of vermiculite in surface soil, such as a very isolated area or a few random flakes, we recommend you wet it and have it removed by contacting the **Asbestos Resource Program (ARP)**. **If possible, leave it alone.** If the material is buried, keep it that way – it's better buried than at the surface.
2. HEPA filter vacuums are effective on small quantities of vermiculite indoors. **Never vacuum vermiculite with a regular vacuum.** HEPA vacuums and wet wiping can be used periodically to remove any small amounts of asbestos containing dust that is introduced into your home or to vacuum dust from previously inaccessible locations such as under recently removed carpets, appliances, and furniture.
3. For larger quantities of vermiculite, such as what you may find in a breached wall, do not disturb the material. **Do not vacuum large amounts of vermiculite – even with a HEPA vacuum.**
4. Dry mowing or rototilling in yards and gardens, where vermiculite is found may cause asbestos to become airborne. If possible, sprinkle your yard or garden with water before mowing or tilling.
5. If you encounter a large amount of vermiculite in soil that cannot be avoided, such as when it was used around pipes, around other structures, or as bulk fill – you may have

sparkling soil – **do not disturb the material. Contact ERS for appropriate evaluation and removal.**

6. If you are planning on remodeling your home, find out if there is vermiculite in the attic or walls, or any of the materials that will be taken out, disturbed, or are likely to create dust. You can call the EPA Information Center at 293-6194, if you are unsure. You should also be aware of specific regulations regarding remodeling, demolition, and disposal that may impact your work, especially big projects.

7. Renters – You have a right to know about any adverse conditions at your rental. Ask your landlord about the presence of vermiculite. If you do not receive the information you request, contact the EPA Information Center or Lincoln County Sanitarian.

Libby asbestos is toxic. It should be avoided or handled with extreme care. The health risk from exposure to all asbestos depends greatly on the amount of asbestos in the material you are disturbing and how long the exposure lasts. Frequent exposures to high levels of asbestos for lengthy periods of time pose a significant risk. Little disturbance of small amounts of vermiculite insulation or other products containing a low level of asbestos poses a smaller risk, especially if you take basic precautions.

Who Can I Contact With Questions About Asbestos?

EPA Information Center – (406) 293-6194

ARP for the Libby/Troy areas – (406) 291-5335

EPA, the ERS, or DEQ may send personnel out to inspect a situation involving vermiculite or LA. They might advise the owner to allow EPA or a licensed asbestos contractor or inspector to take samples, conduct cleanup, or take other special measures to reduce the risk of asbestos exposure. A list of licensed inspectors and contractors can be found at the Information Center.

Montana Department of Environmental Quality
Asbestos Control Program
(406) 444-5300

Montana law requires that employers hire a licensed inspector to determine if asbestos is present before doing any work. Asbestos that is not associated with the Libby vermiculite mine is still regulated by Montana DEQ. If non-Libby asbestos is found, it should be dealt with according to Montana regulations. Visit Montana DEQ's Asbestos web site at:

www.deq.mt.gov/Asbestos

Please learn about the risks of asbestos exposure and basic precautions by reviewing the fact sheets available at the **Information Centers** or the website listed below:

- **HEPA Vacuum Cleaner Program** – *Revised, January 2014*. Provides information on the effectiveness of HEPA vacuums and describes their role in Libby's cleanup.
- **Lincoln County Do-It-Yourselfers** – *Revised January 2014*
- **Contractors & Tradesmen Working Indoors** – *Revised January 2014*
- **Contractors & Tradesmen Working Outdoors** – *Revised January 2014*
- **Yard Work and Gardening Activities** – *Revised January 2014*
- **Demolition Activities** – *Revised January 2014*
- **Explore the EPA web site and its links at: http://www2.epa.gov/region8/libby-asbestos**

Yard Work and Gardening Activities

What To Do If You Are Working In Your Yard and Come Across Soil That Contains Vermiculite or Asbestos

Revised: January 2014

Vermiculite In Libby & Troy

For several decades, vermiculite was commonly used in and around homes in Lincoln County for a variety of applications, including as a soil additive, construction aggregate, and attic insulation. If vermiculite is present, it might contain Libby Amphibole asbestos (LA).

Exposure to LA could lead to serious diseases such as asbestosis, lung cancer, and mesothelioma. It will take several more years for EPA to complete the cleanup, and property owners might encounter vermiculite during that time or even after EPA has finished its work. It is not possible for EPA to remove (or to even know about) *all* the vermiculite in the area.

It is possible that you might unexpectedly find vermiculite after starting your yard work or gardening activities. If you do, EPA strongly cautions you not to disturb it further and cause LA to become airborne.

Precautionary Steps To Take While Working In Your Yard

The Do's:

1. **Do** water often. A healthy lawn reduces dust and contact with bare soil.
2. **Do** mow your lawn or roto-till your garden when it's damp—not when it's dry or dusty.
3. **Do** rinse off any rental equipment within your work area before returning the equipment.
4. **Do** rinse off gardening tools outside within your work area after every use.
5. **Do** wipe your feet and/or take your shoes off at the door and leave them outside, if possible.
6. **Do** wash your hands outdoors after any yard work, if possible.
7. **Do** call the **Lincoln County Asbestos Resource Program (ARP)** **at no cost to you** if you see ANY vermiculite on your property, even if you are unsure. While waiting for ARP to arrive, take precautions to not disturb the area.

The Don'ts:

1. **Don't** disturb areas where you can see vermiculite. If it's a place you intend to work in, cover the vermiculite and call **ARP**.
2. **Don't** dig, cultivate, mow, rake or roto-till your yard or garden when it's dry and dusty.
3. **Don't** bring dusty or dirty things inside.

The photo on the immediate right is an example of raw vermiculite in soils. When heated, vermiculite exfoliates (or pops), forming a lightweight material ideal for packing, insulation, and as a soil additive as shown in the far right photo.

Cautions regarding Libby Amphibole:

- LA should be avoided or handled with extreme care.
- Exposure to Libby Amphibole asbestos has resulted in disease in workers and non-workers who have had contact with contaminated materials. Take care not to bring any contaminated clothing or material back to your home or business.
- Treat any asbestos containing material as regulated material and comply with all state and local regulations.

There is no known threshold risk level for asbestos-containing materials, and any exposure will increase the risk of asbestos-related disease. The health risk from exposure to **all** asbestos depends greatly on the amount of asbestos in the material you are disturbing and how long the exposure lasts. If you take the basic precautions outlined in this fact sheet, your project will be completed with minimal exposure to LA.

Who Can I Contact With Questions About Asbestos?

EPA Information Center – 108 E. 9th Street; Libby, MT 59923 – (406) 293-6194
Lincoln County Asbestos Resource Program (ARP) – (406) 291-5335
Montana Department of Environmental Quality –
Asbestos Control Program (406) 444-5300

Please learn about the risks of asbestos exposure and basic precautions by reviewing the fact sheets available at the **Information Centers** or the website listed below:

- **HEPA Vacuum Cleaner Program** – *Revised May January 2014.*
- **Lincoln County Do-It-Yourselfers** – *Revised January 2014*
- **Contractors & Tradesmen Working Indoors** – *Revised January 2014*
- **Contractors & Tradesmen Working Outdoors** – *Revised January 2014*
- **Libby & Troy Residents: Vermiculite or Asbestos In or Around Your Home or Business** – *Revised January 2014*
- **Demolition Activities** — *Revised January 2014*

Explore the EPA web site and its links at: http://www2.epa.gov/region8/libby-asbestos

Indoors:

DO wipe your feet and/ or take your shoes off at the door and leave them outside, if possible.

DO wash your hands after gardening, playing outdoors, or doing other messy things.

DO vacuum frequently, and only use a HEPA* vacuum.

*High Efficiency Particulate Air - learn more about these vacuums at the EPA Info Center

DO call the Lincoln County ***Asbestos Resource Program (ARP)*** if you see ANY vermiculite on your property **(406) 291-5335.**

If you are unsure about material you are bringing onto your property, call the **ARP** to have it sampled first.

DON'T bring dusty or dirty things inside.

DO keep your pets clean.

DO use a HEPA vacuum to remove dust from clothing, furniture, drapes, etc.

Photo of raw (left) and processed (right) vermiculite. *View samples at the EPA Info Center.*

Libby Asbestos Superfund Site
EPA Information Center
108 E. 9th ST., Libby, MT 59923
(406) 293-6194

Revised January 2014

Don’t

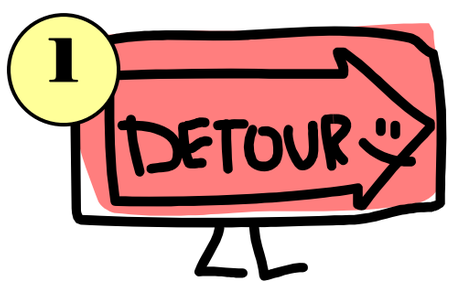
let an unwanted visitor into your home!!

13 simple steps to protect yourself and your loved ones from Libby Amphibole Asbestos (LA)

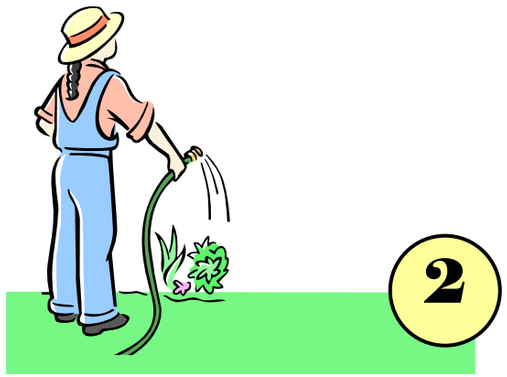
Reducing contact with disturbed, contaminated soil is important in reducing your exposure to LA. LA poses the greatest threat when it is airborne.
For a lower risk of exposure, focus on keeping contaminated soil from being disturbed in your yard and trapped in your home.

This flyer gives some common sense tips on avoiding exposure to LA on your property.

Outdoors:



DON’T disturb areas where you can see vermiculite *(see picture on back)*. Find other places to play or garden.

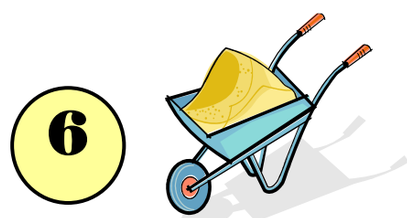


DO water often. A healthy lawn reduces dust and contact with bare soil.

DO mow your lawn when it’s damp – not when it’s dry and dusty.

DON’T dig, cultivate, or roto-till your garden soil when it is dry and dusty, and do suppress any dust with water.

DO rinse off gardening tools outside.



DON’T buy or accept free topsoil or fill from an unknown source. If you are unsure, call the EPA Info Center.

Appendix E

O&M Cost Estimate

OU5 Operation and Maintenance Costs

TABLE PV-OU5 O&M

PRESENT VALUE ANALYSIS

Opinion of Probable Cost

O&M Cost Estimate

Site: OU5
Location: Lincoln County, MT
Phase: O&M
Base Year: 2017

Year[1]	Annual Site Maintenance and Monitoring Costs	Periodic Costs (Major Breach Repair)	Total Annual Expenditure[2]	Discount Factor (7.0%)	Present Value[3]
2017	$0	$0	$0	1.0000	$0
2018	$36,000	$0	$36,000	0.9346	$33,646
2019	$36,000	$0	$36,000	0.8734	$31,442
2020	$36,000	$59,000	$95,000	0.8163	$77,549
2021	$36,000	$0	$36,000	0.7629	$27,464
2022	$36,000	$0	$36,000	0.7130	$25,668
2023	$36,000	$59,000	$95,000	0.6663	$63,299
2024	$36,000	$0	$36,000	0.6227	$22,417
2025	$36,000	$0	$36,000	0.5820	$20,952
2026	$36,000	$59,000	$95,000	0.5439	$51,671
2027	$36,000	$0	$36,000	0.5083	$18,299
2028	$36,000	$0	$36,000	0.4751	$17,104
2029	$36,000	$59,000	$95,000	0.4440	$42,180
2030	$36,000	$0	$36,000	0.4150	$14,940
2031	$36,000	$0	$36,000	0.3878	$13,961
2032	$36,000	$59,000	$95,000	0.3624	$34,428
2033	$36,000	$0	$36,000	0.3387	$12,193
2034	$36,000	$0	$36,000	0.3166	$11,398
2035	$36,000	$59,000	$95,000	0.2959	$28,111
2036	$36,000	$0	$36,000	0.2765	$9,954
2037	$36,000	$0	$36,000	0.2584	$9,302
2038	$36,000	$59,000	$95,000	0.2415	$22,943
2039	$36,000	$0	$36,000	0.2257	$8,125
2040	$36,000	$0	$36,000	0.2109	$7,592
2041	$36,000	$59,000	$95,000	0.1971	$18,725
2042	$36,000	$0	$36,000	0.1842	$6,631
2043	$36,000	$0	$36,000	0.1722	$6,199
2044	$36,000	$59,000	$95,000	0.1609	$15,286
2045	$36,000	$0	$36,000	0.1504	$5,414
2046	$36,000	$0	$36,000	0.1406	$5,062
2047	$36,000	$59,000	$95,000	0.1314	$12,483
TOTALS:	$1,080,000	$590,000	$1,670,000		$674,438
TOTAL PRESENT VALUE OF OU5 O&M COSTS [4]					**$670,000**

Notes:

For cost estimating purposes, O&M costs are presented for a 30-year period after determination of O&F.

Costs presented are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented and methodology used for estimating.

This cost accuracy range is consistent with EPA's Remedial Design/Remedial Action Handbook (EPA 1995) for preliminary development of O&M activities and responsibilities.

[1] Duration is assumed to be 30 years for present value analysis.

[2] Total annual expenditure is the total cost per year with no discounting.

[3] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[4] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE CS-OU5 O&M

Opinion of Probable Cost

O&M Cost Estimate

COST ESTIMATE SUMMARY

Site: OU5
Location: Lincoln County, MT
Phase: O&M
Base Year: 2017
Date: October 19, 2017

ANNUAL COST - SITE MAINTENANCE AND MONITORING (Years 1 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Observe Site Conditions[1]					
Inspect the Integrity of Physical Remedies	1	LS	$1,866	$1,866	Unit costs, quantities, and calculations in Cost Worksheets Report
Inspect the Integrity of Engineered Controls	1	LS	$280	$280	Unit costs, quantities, and calculations in Cost Worksheets Report
Routine Reporting	1	LS	$3,414	$3,414	Unit costs, quantities, and calculations in Cost Worksheets Report
Physical Remedy Maintenance Activities[2]					
Repair of a minor breach[3] of building material physical remedies	1	LS	$5,247	$5,247	Unit costs, quantities, and calculations in Cost Worksheets Report
Repair of a minor breach of soil physical remedies	1	LS	$9,162	$9,162	Unit costs, quantities, and calculations in Cost Worksheets Report
Future Encounters with Contaminated Material	1	YR	$2,472	$2,472	Assume 50% of historically incurred annual costs relate to exterior, includes U-Dig. Unit costs, quantities, and calculations in Cost Worksheets Report
SUBTOTAL				$22,441	
Contingency (Scope and Bid)	20%			$4,488	10% Scope, 10% Bid (Low end of the recommended range in EPA 540-R-00-002).
SUBTOTAL				$26,929	
Project Management[6]	10%			$2,693	Middle value of the recommended range in EPA 540-R-00-002 was used.
Technical Support[7]	20%			$5,386	Upper value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$35,008	
Monitor Institutional Controls[5]	4	EA	$225	$900	Unit costs, quantities, and calculations in Cost Worksheets Report
TOTAL				$900	
TOTAL ANNUAL O&M COST				**$36,000**	Total capital cost is rounded to the nearest $1,000.

PERIODIC COST - REPAIR OF MAJOR[4] BREACHES (Years 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30)

Repair of a major breach of building material physical remedies	1	LS	$9,022	$9,022	Unit costs, quantities, and calculations in Cost Worksheets Report
Repair of a major breach of soil physical remedies	1	LS	$27,244	$27,244	Unit costs, quantities, and calculations in Cost Worksheets Report
SUBTOTAL				$36,266	
Contingency (Scope and Bid)	25%			$9,067	15% Scope, 10% Bid (Low end of the recommended range in EPA 540-R-00-002).
SUBTOTAL				$45,333	
Project Management	10%			$4,533	Middle value of the recommended range in EPA 540-R-00-002 was used.
Technical Support	20%			$9,067	Upper value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$58,933	
TOTAL PERIODIC COST				**$59,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-OU5 O&M

Opinion of Probable Cost

O&M Cost Estimate

COST ESTIMATE SUMMARY

Site:	OU5
Location:	Lincoln County, MT
Phase:	O&M
Base Year:	2017
Date:	October 19, 2017

Notes:

Percentages used for contingency and professional/technical services costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.
Costs presented are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented and methodology used for estimating.

[1]Non-intrusive visual site inspections will be conducted to ensure integrity of the physical remedy or engineered control remains intact and assumed to be performed at least annually

[2] Physical remedy and engineering control maintenance activities include repairing of minor breaches that occur from general wear and tear or erosion resulting in exposure to asbestos containing material.

[3]A minor breach occurs when exposure to contaminated soil beneath the backfill or contaminated building material may result, but can be repaired without additional excavation of contaminated soil or removal of building materials.

[4]A major breach occurs when significant exposure to contaminated soil beneath the backfill or contaminated building material may result and additional excavation, removal or encapsulation of contaminated materials would be required. Contaminated soil or building materials exposed by a major breach will be excavated/remediated and disposed of at an approved facility. Sampling and analysis would be conducted to confirm that contamination did not migrate outside of the breached area.

[5] ICs evaluation will be conducted to assess whether the selected IC instrument remains in place and whether the ICs are enforced such that they meet the stated objectives and performance goals and provide protection required by the response.

[6] Project management includes, but is not limited to, planning and reporting , community relations support, contract administration, permitting (if needed), and legal services outside of ICs.

[7] Technical support includes, but is not limited to, oversight of O&M activities and progress reporting.

EA Each
LS Lump Sum
PR Per property
QTY Quantity
YR Year

OU5 5-Year Review Costs

TABLE PV-OU5 5_YEAR REVIEW

PRESENT VALUE ANALYSIS

Opinion of Probable Cost

O&M Cost Estimate

Site: OU5
Location: Lincoln County, MT
Phase: O&M
Base Year: 2017

Year[1]	Annual Site Maintenance and Monitoring Costs	Periodic Costs (Major Breach Repair)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[2]	Discount Factor (7.0%)	Present Value[3]
2017	$0	$0	$0	$0	1.0000	$0
2018	$0	$0	$0	$0	0.9346	$0
2019	$0	$0	$0	$0	0.8734	$0
2020	$0	$0	$0	$0	0.8163	$0
2021	$0	$0	$0	$0	0.7629	$0
2022	$0	$0	$44,000	$44,000	0.7130	$31,372
2023	$0	$0	$0	$0	0.6663	$0
2024	$0	$0	$0	$0	0.6227	$0
2025	$0	$0	$0	$0	0.5820	$0
2026	$0	$0	$0	$0	0.5439	$0
2027	$0	$0	$44,000	$44,000	0.5083	$22,365
2028	$0	$0	$0	$0	0.4751	$0
2029	$0	$0	$0	$0	0.4440	$0
2030	$0	$0	$0	$0	0.4150	$0
2031	$0	$0	$0	$0	0.3878	$0
2032	$0	$0	$44,000	$44,000	0.3624	$15,946
2033	$0	$0	$0	$0	0.3387	$0
2034	$0	$0	$0	$0	0.3166	$0
2035	$0	$0	$0	$0	0.2959	$0
2036	$0	$0	$0	$0	0.2765	$0
2037	$0	$0	$44,000	$44,000	0.2584	$11,370
2038	$0	$0	$0	$0	0.2415	$0
2039	$0	$0	$0	$0	0.2257	$0
2040	$0	$0	$0	$0	0.2109	$0
2041	$0	$0	$0	$0	0.1971	$0
2042	$0	$0	$44,000	$44,000	0.1842	$8,105
2043	$0	$0	$0	$0	0.1722	$0
2044	$0	$0	$0	$0	0.1609	$0
2045	$0	$0	$0	$0	0.1504	$0
2046	$0	$0	$0	$0	0.1406	$0
2047	$0	$0	$44,000	$44,000	0.1314	$5,782
TOTALS:	$0	$0	$264,000	$264,000		$94,940
TOTAL PRESENT VALUE OF OU5 5-YEAR REVIEW COSTS						**$90,000**

Notes:

For cost estimating purposes, O&M costs are presented for a 30-year period after determination of O&F. The first 5-year review is assumed to occur in 2022.

Costs presented are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented and methodology used for estimating.

This cost accuracy range is consistent with EPA's Remedial Design/Remedial Action Handbook (EPA 1995) for preliminary development of O&M activities and responsibilities.

[1] Duration is assumed to be 30 years for present value analysis.

[2] Total annual expenditure is the total cost per year with no discounting.

[3] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[4] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE CS-OU5 5-YEAR REVIEW

Opinion of Probable Cost

O&M Cost Estimate

COST ESTIMATE SUMMARY

Site: OU5
Location: Lincoln County
Phase: O&M
Base Year: 2017
Date: October 19, 2017

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Visual Site Inspection	1	LS	$3,534	$3,534	Unit costs, quantities, and calculations in Cost Worksheets Report
Ambient Air Sampling	1	LS	$9,888	$9,888	Assumed 3 samples per event. Unit costs, quantities, and calculations in Cost Worksheets Report .
5-Year Site Review Report	1	LS	$14,520	$14,520	Unit costs, quantities, and calculations in Cost Worksheets Report
SUBTOTAL				$27,941	
Contingency (Scope and Bid)	20%			$5,588	10% Scope, 10% Bid (Low end of the recommended range in EPA 540-R-00-002).
SUBTOTAL				$33,529	
Project Management	10%			$3,353	Middle value of the recommended range in EPA 540-R-00-002 was used.
Technical Support	20%			$6,706	Upper value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$43,588	
TOTAL PERIODIC COST				**$44,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Percentages used for contingency and professional/technical services costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Costs presented are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented and methodology used for estimating.

Abbreviations:

LS Lump Sum
QTY Quantity

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU5
Location: Lincoln County, MT
Phase: O&M
Base Year: 2017

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

Cost Worksheets Report

PROJECT:	Libby OU5 O&M Cost Estimate	COMPUTED BY :	EB	CHECKED BY:	JN
JOB NO.:	6460.DK3.212.TECHS	DATE :	10/19/2017	DATE CHECKED:	10/23/2017
CLIENT:	USACE - Omaha District			PAGE NO. :	CALC-OU5

Description: Calculations for Operation and Maintenance Costs - Libby, OU5

Annual Costs		
Evaluating and Updating Institutional Controls		
Total Quantities for Updating Institutional Controls		
Total Number of Parcels for ICs, EA:	**5**	
Quantities per Parcel		
Environmental Lawyer, HR:	0.5	
Paralegal, HR:	1	
Administrative Clerk, HR:	0.5	
Document Submission and Recording Allowance, EA:	1.0	
Total Quantities for Updating Institutional Controls		
Environmental Lawyer, HR:	2.5	
Paralegal, HR:	5.0	
Administrative Clerk, HR:	2.5	
Document Submission and Recording Allowance, EA:	5.0	
Routine OU5 Site Inspections		
Inspect the Integrity of Physical Remedies		
Assumed Time for Inspection, WK:	0.5	
Assumed Time for Inspection, DY:	2.5	
Inspect the Integrity of Engineered Controls		
Assumed Time for Inspection, HR:	3	
Routine Reporting		
Site Inspection Report Allowance. LS:	1	
Project Manager, HR:	2	
Environmental Engineer, HR:	8	
Environmental Scientist, HR:	10	
Quality Control Engineer, HR:	2	
CAD Drafter, HR:	5	
Administrative Clerk, HR:	5	
Copy and Shipping Allowance, LS:	1	
Physical Remedy Maintenance Activities		
Repair of Minor Breaches to the Physical Remedy (annual)		
Repair of a minor breach of building material physical remedies		*Scope and quantities based on historical data in Response Manager for OU5*
Number of Maintenance Event per Year, EA;	2	
Number of Hours of Interior Cleaning per Event, HR:	8	
Number of Hours of Maintenance per Event, HR:	8	
Number of Hours of Interior Cleaning Annual, HR:	16	
Number of Hours of Maintenance Annual, HR:	16	

Description: Calculations for Operation and Maintenance Costs - Libby, OU5

Repair of a minor breach of soil physical remedies		*Scope and quantities based on historical data in Response Manager for OU5*
Delivery of Borrow Material from Borrow Source		
Topsoil Borrow Volume Required, ECY:	150	
Topsoil Borrow Volume Required, LCY:	167	
Topsoil Borrow Volume Required, BCY:	145	
Seeding		
Area to be seeded, SF:	7,826	
Area to be seeded, ACR:	0.18	
Dust Control		
Dust Control Area, ACR:	0.18	
Future Encounters with Contaminated Material		
This program provides a local asbestos specialist to answer questions, conduct inspections, and assist in removal activities for LA contamination. Costs based on previous work.		
Future Encounters with Contaminated Material , YR:	**1**	*Assume 50% of historically incurred annual costs relate to exterior, includes U-Dig. Unit costs, quantities, and calculations in Cost Worksheets Report*

Periodic Costs

Repair of Major Breaches to the Physical Remedy (assumed to be Incurred During Calendar Years (2020, 2023, 2026, 2029, 2032,2035, 2038, 2041, 2044, 2047)

Repair of a major breach of soil physical remedies		*Scope and quantities based on historical data in Response Manager for OU5*
Mobilization/Demobilization:		
Mobilization/Demobilization - Medium Equipment, EA:	1	
Mobilization/Demobilization - Small Equipment, EA:	1	
Mobilization/Demobilization - Self-Propelled Equipment, EA:	2	
Contaminated Soil Excavation and Disposal:		
Excavator Productivity (Open Areas), BCY/HR:	48.8	*See Sheet PD-02A*
Contaminated Area, SF:	3,000	
Excavation Depth, FT:	3	
Contaminated Soil Excavation, BCY:	334	
Equipment Decontamination, DY:	1	
Poly Tank, 5,000 Gal, EA:	1	
Transportation for Disposal-Former Libby Vermiculite Mine, BCY:	334	
Transportation for Disposal-Former Libby Vermiculite Mine, LCY:	384	
Number of Clearance Samples, EA:	3	
Delivery of Borrow Material from Borrow Source		
Assumes topsoil and common fill borrow materials are developed off-site. One-way haul distance of 20 miles for common fill from borrow source to the site. One-way haul distance of 90 miles for topsoil from borrow source to the site. One-way haul distance of 5 miles for gravel from borrow source to the site.		
Common Fill Borrow Volume Required, ECY:	278	
Common Fill Borrow Volume Required, LCY:	309	
Common Fill Borrow Volume Required, BCY:	288	
Topsoil Borrow Volume Required, ECY:	33	
Topsoil Borrow Volume Required, LCY:	37	
Topsoil Borrow Volume Required, BCY:	35	
Gravel Volume Required, ECY:	22	
Gravel Volume Required, LCY:	25	
Gravel Volume Required, BCY:	23	

Description: Calculations for Operation and Maintenance Costs - Libby, OU5

Total Borrow Volume, ECY:	333	
Total Borrow Volume, LCY:	370	
Total Borrow Volume, BCY:	345	
Backfill of Excavated Areas		
Backfill will consist of 2.5 ft of common fill and 6 inches of topsoil or 6 inches of gravel. Assumes that 60% of area will require topsoil cover and 40% will require gravel cover.		
Common Fill Backfill Volume, ECY:	278	
Common Fill Backfill Volume, LCY:	309	
Topsoil Backfill Volume, ECY:	33	
Topsoil Backfill Volume, LCY:	37	
Gravel Backfill Volume, ECY:	22	
Gravel Backfill Volume, LCY:	25	
Total Backfill Volume, ECY:	333	
Total Backfill Volume, LCY:	370	
Orange Geotextile Warning Barrier, SF:	3,000	
Seeding:		
Seeding (Open Areas), AC:	0.05	
Dust Control:		
Assumes water-based dust suppression during implementation of remedial work to minimize exposures to LA contamination		
Total Area for Dust Control, AC:	**0.05**	
Construction Safety and Traffic Control		
Barricade and Traffic Control Setup, DAY:	1	
3" x 1,000' Yellow Caution Tape, Roll:	1	
3" x 1,000' Red Danger Asbestos Haz Tape, Roll:	1	
Reflecting Barricade with Light, EA:	4	
Orange Safety Fence with Post, LF:	260	
Five-Year Review		
Visual Site Inspection		
Assumed Time for Inspection, WK:	0.5	
Assumed Time for Inspection, DY:	2.5	
Five-Year Review Report - OU5		
Project Manager, HR:	15	
Environmental Engineer, HR:	30	
Environmental Scientist, HR:	45	
Quality Control Engineer, HR:	6	
CAD Drafter, HR:	15	
Administrative Clerk, HR:	15	
Copy and Shipping Allowance, LS:	1	
Ambient Air Sampling		
ABS Samples per Sampling Event, EA:	3	*Assumed*
Equipment (Per Event), LS:	1	
Supplies (Per Event), LS:	1	

PROJECT:	Libby OU5 O&M Cost Estimate	COMPUTED BY :	EB	CHECKED BY:	JN
JOB NO.:	6460.DK3.212.TECHS	DATE :	10/19/2017	DATE CHECKED:	10/23/2017
CLIENT:	USACE - Omaha District			PAGE NO. :	GA

Description: General Assumptions for Libby OU5 Cost Estimate

General Assumptions

Estimated Work Week and Work Day Duration

Days per work week:	**5**	
Hours per workday:	**8**	

Assumed Material Properties

Soil Bulking factor:	**1.15**	*Conversion from BCY to LCY*
Soil Compaction Factor:	**1.035**	*Conversion from BCY to ECY*
Soil Compaction Factor:	**0.9**	*Conversion from LCY to ECY*

BCY - bank cubic yard - in place volume prior to excavation
LCY - loose cubic yards - volume after excavation
ECY - embankment cubic yards (aka compacted cubic yards) - volume after compaction

Density of Gravel, TN/CY:	**1.4**	*Means Handbook, Fig 2.4, Pg.46 (Gravel, Dry)*
Density of Riprap, TN/CY:	**1.5**	*Means Handbook, Fig 2.5, Pg.47 (Granite, Loose)*
Density of Soil, TN/CY:	**1.35**	
Conversion, SF/ACR:	**43560**	

http://www.wdol.gov is the website for current Davis Bacon & Service Labor Rates that is used to determine wage rates for Lincoln County, MT (2015) updated in January 2015. Professional labor rates were determined using flcdatacenter.com tailored to the western Montana updated in January 2015.

Description	LaborRate	JBaseWage	Travel	TaxableFringe	NonTaxFringe	Subsistence
Labor Rates						
B Building Workers - (Includes Tunneling)						
B- Average of All Construction Laborers						
MIL B-SKILLWKR Skilled Workers						
Montana Labor 2015	Montana Labor 2015	25.19	0.00	8.05	0.00	0.00
BK Laborers						
BKA Laborers General						
MIL B-LABORER Laborers, (Semi-Skilled)						
Montana Labor 2015	Montana Labor 2015	24.97	0.00	8.05	0.00	0.00
BL Operating Engineers						
BLA Operating Engineers General						
MIL B-EQOPRCRB Equip. Operators Crane with Boom Pay						
Montana Labor 2015	Montana Labor 2015	31.94	0.00	9.90	0.00	0.00
MIL B-EQOPRCRN Equip. Operators, Heavy						
Montana Labor 2015	Montana Labor 2015	29.91	0.00	9.90	0.00	0.00
MIL B-EQOPRMED Equip. Operators, Medium						
Montana Labor 2015	Montana Labor 2015	29.05	0.00	9.90	0.00	0.00
MIL B-EQOPRLT Equip. Operators, Light						
Montana Labor 2015	Montana Labor 2015	27.02	0.00	9.90	0.00	0.00
BQ Teamsters						
BQA Teamster General						
26. B-TRKDVRHV Truck Drivers, Heavy						
Montana Labor 2015	Montana Labor 2015	29.06	0.00	9.16	0.00	0.00
MIL B-TRKDVRLT Truck Drivers, Light						
Montana Labor 2015	Montana Labor 2015	23.39	0.00	9.16	0.00	0.00
BC Pipefitters / Plumbers						
BCA Pipefitters / Plumbers General						
MIL B-PLUMBER Plumbers						
Montana Labor 2015	Montana Labor 2015	27.58	0.00	12.93	0.00	0.00
MIL B-STM/PIPE Steam/Pipefitters						
Montana Labor 2015	Montana Labor 2015	27.58	0.00	12.93	0.00	0.00
BD Carpenters						
BDA Carpenters General						
MIL B-CARPNTER Carpenters						
Montana Labor 2015	Montana Labor 2015	30.01	0.00	10.82	0.00	0.00
BH Cement Finishers / Plasters / Lathers						

Currency in US dollars

Description	LaborRate	JBaseWage	Travel	TaxableFringe	NonTaxFringe	Subsistence
BHA Cement Finishers / Plasters / Lathers General						
MIL B-CEMTFINR Cement Finishers						
Montana Labor 2015	Montana Labor 2015	26.87	0.00	9.80	0.00	0.00
BJ Iron Workers						
BJA Iron Workers General						
MIL B-STRSTEEL Structural Steel Workers						
Montana Labor 2015	Montana Labor 2015	35.28	0.00	19.98	0.00	0.00
MIL B-RODMAN Rodmen, (Reinforcing)						
Montana Labor 2015	Montana Labor 2015	35.28	0.00	19.98	0.00	0.00
BE Electricians						
BEA Electrician						
MIL B-ELECTRN Electricians						
Montana Labor 2015	Montana Labor 2015	36.40	0.00	12.59	0.00	0.00
BA Asbestos Worker						
MIL B-ASBTSWKR Asbestos Workers						
Montana Labor 2015	Montana Labor 2015	33.42	0.00	17.85	0.00	0.00
F Field Office Construction Workers						
FA Field Supervision and Management Personnel						
FOP FA-AGENS General Superintendents (P.M.)						
Montana Labor 2015	Montana Labor 2015	47.01	0.00	10.20	0.00	0.00
FOP FA-PROJM Project Managers						
Montana Labor 2015	Montana Labor 2015	49.08	0.00	10.65	0.00	0.00
FB Field Office Management Personnel						
FOP FB-CLTYP Clerks, Typists, Bookkeepers & Receptionist						
Montana Labor 2015	Montana Labor 2015	13.33	0.00	2.89	0.00	0.00
FC Field Engineering Personnel						
FOP FC-ENCGE Geologist						
Montana Labor 2015	Montana Labor 2015	35.53	0.00	7.71	0.00	0.00
FOP FC-ENGCI Engineers, Civil						
Montana Labor 2015	Montana Labor 2015	34.07	0.00	7.39	0.00	0.00
FOP FC-ENGPE Engineers, Project						
Montana Labor 2015	Montana Labor 2015	34.29	0.00	7.44	0.00	0.00
FOP FC-ENGQC Engineers, Quality Control						
Montana Labor 2015	Montana Labor 2015	51.52	0.00	11.18	0.00	0.00
FOP FC-FLDER Field Engineers						
Montana Labor 2015	Montana Labor 2015	19.26	0.00	4.18	0.00	0.00
FOP FC-SURYR Surveyors						

Currency in US dollars

Description	LaborRate	JBaseWage	Travel	TaxableFringe	NonTaxFringe	Subsistence
Montana Labor 2015 FOP FC-SURYC Surveyors, Chief	Montana Labor 2015	22.70	0.00	4.93	0.00	0.00
Montana Labor 2015	Montana Labor 2015	29.84	0.00	6.48	0.00	0.00
FD Field Safety, Security, and Fire Personnel FOP FD-SAENG Safety Engineers						
Montana Labor 2015 FOP FD-SECWT Security, Watchmen/Guards	Montana Labor 2015	34.92	0.00	7.58	0.00	0.00
Montana Labor 2015	Montana Labor 2015	11.65	0.00	2.53	0.00	0.00
HO Home Office / HTRW Professional Labor HTW HO-CADD Drafter CAD						
Montana Labor 2015 HTW HO-STFENG Environmental Engineer	Montana Labor 2015	19.68	0.00	4.27	0.00	0.00
Montana Labor 2015 HTW HO-FLDTCH Field Technician (HTW Projects)	Montana Labor 2015	34.29	0.00	7.44	0.00	0.00
Montana Labor 2015 HTW HO-STFSCI Environmental Scientist	Montana Labor 2015	19.26	0.00	4.18	0.00	0.00
Montana Labor 2015	Montana Labor 2015	30.58	0.00	6.64	0.00	0.00
UC User Created USR UC-FLAG Flagger						
Montana Labor 2015	Montana Labor 2015	21.90	0.00	8.05	0.00	0.00
L Legal Labor LGL L-ASPRE Environmental Lawyer						
Montana Labor 2015 LGL L-LARE Paralegal	Montana Labor 2015	48.11	0.00	10.44	0.00	0.00
Montana Labor 2015	Montana Labor 2015	20.80	0.00	4.51	0.00	0.00

Currency in US dollars