LIBBY ASBESTOS SUPERFUND SITE
OPERABLE UNIT 3
REMEDIAL INVESTIGATION

2013
FINAL FIELD SAMPLING SUMMARY REPORT

PHASE VB-2013 ECOLOGICAL STUDY
WILDFIRE CONTINGENCY MONITORING PLAN
VERMICULITE WASTE REMOVAL

October 2014

Prepared for and with oversight by:

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LIST OF ACRONYMS AND ABBREVIATIONS

ABS	Activity-Based Air Sampling
AOC	Administrative Order on Consent
CDM	CDM Smith
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	chain-of-custody
COPC	Contaminants of potential concern
EPA	U.S. Environmental Protection Agency
FSDS	Field sample data sheet
FSRZ	Fire Suppression Restriction Zone
FSSR	Field Sampling Summary Report
GPS	Global positioning system
HDPE	High density polyethylene
HDR	HDR, Inc.
Index ID	Index identification number
LA	Libby Amphibole
LRC	Lower Rainy Creek
MDEQ	Montana Department of Environmental Quality
MWH	MWH Americas, Inc.
NSY	Noisy Creek
OU3	Operable Unit 3
OU4	Operable Unit 4
PDF	Portable Document Format
PLM-VE	Polarized light icroscopy visual estimation
QAPP	Quality Assurance Project Plan
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan

LIST OF ACRONYMS AND ABBREVIATIONS

(continued)

SOP	Standard Operating Procedure
SPF	Soil Preparation Facility
TEM	Transmission electron microscopy
USFS	United States Forest Service
URC	Upper Rainy Creek
VWRA	Vermiculite Waste Removal Action
WVBs	Whitlock-Vibert Boxes

1.0 PROJECT OVERVIEW

1.1 BACKGROUND SUMMARY

The vermiculite deposit at Vermiculite Mountain, six miles northeast of Libby, Montana, contains veins of asbestiform amphibole minerals (e.g., winchite, richterite and tremolite). The asbestiform amphibole minerals that occur at Vermiculite Mountain are collectively termed "Libby Amphibole" (LA) by the U.S. Environmental Protection Agency (EPA). Historic mining, milling, and processing of vermiculite from the former mine at Vermiculite Mountain released LA fibers to the environment. Long-term exposure to LA fibers associated with the vermiculite may have caused adverse health effects in some workers at the mine and processing facilities and EPA suspects others in Libby.

In 2000, EPA began cleanup actions at Libby under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; also known as Superfund) to eliminate sources of LA exposure to residents and workers. Initial efforts were focused mainly on wastes remaining at former vermiculite processing areas. As work progressed, action shifted to cleanup of homes and workplaces in the residential/commercial areas of Libby, designated by EPA as Operable Unit 4 (OU4) of the Libby Asbestos Site.

As part of the Superfund designation of the Libby Asbestos Site, the former mine and environs at Vermiculite Mountain were designated Operable Unit 3 (OU3). OU3 includes the property in and around the former vermiculite mine and forest areas surrounding the mine that may have been impacted by releases and subsequent migration of materials from the mine. The mine site and the preliminary study area boundary of OU3 are shown on **Figure 1-1**. EPA established the preliminary study area boundary for the purpose 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 on the nature and extent of environmental impacts, if any, associated with releases that may have occurred from the mine site.

1.2 PURPOSE OF THIS DOCUMENT

EPA has entered into an Administrative Settlement Agreement and Order on Consent (AOC) signed in September 2007 for implementation of RI/FS study activities, with Respondents W.R. Grace & Co.-Conn. and Kootenai Development Corporation (collectively Grace). Under the terms of the AOC, the Respondents implemented the Phase I, Phase II, Phase III, Phase IV, Phase V, Phase VB-2013 and Wildfire Phase and relevant SAPs at OU3. EPA also entered into a 2012 AOC between the EPA and Grace for implementation of a Vermiculite Waste Removal Action (VWRA) near an area of the site referred to as the "Amphitheater".

This 2013 FSSR is a summary of site activities performed in accordance the AOC pertaining to RI/FS activities conducted at OU3 during the 2013 field season and is supplemented with the summary of activities pertaining to the VWRA performed during the 2012-2013 field season.

The following sections briefly describe each Remedial Investigation phase and the VWRA event. Analytical results for samples collected for implementation of RI/FS activities pursuant to the 2007 AOC and for the VWRA pursuant to the 2012 AOC are not presented in this document.

1.2.1 Phase I Remedial Investigation

In September 2007, EPA initiated a RI/FS of OU3 and produced the *Phase I Sampling and Analysis Plan* (SAP) *for Operable Unit 3, Libby Asbestos Superfund Site* (OU3 Phase I SAP; USEPA 2007) to begin the characterization of environmental conditions at OU3. The OU3 Phase I SAP contains information on the history and operations of the former mine and discussions on general site geography, geology, hydrology and other relevant background information. The SAP also contains the preliminary sampling locations and the Standard Operating Procedures (SOPs) that were used as guidance during the OU3 Phase I RI performed in October 2007. Phase I included sampling and analysis of soil, mine wastes, sediment, surface water, and ambient air at the former mine site, and tree bark, duff, and mineral soil on the mine site and in surrounding forested areas within an eight-mile radius of the mine site. The field sampling performed as part of the Phase I RI

is summarized in the *Field Sampling Summary Report* (FSSR)*: Phase I Remedial Investigation Operable Unit 3, Libby Asbestos Superfund Site* (MWH 2007), which documents the sampling locations and procedures employed during the Phase I RI at OU3.

Prior to implementing the OU3 Phase I RI, EPA collected very limited information to evaluate contaminants of potential concern (COPC) at the former Vermiculite Mountain mine property and potential releases to adjacent forest lands, surface water, and groundwater. Areas outside the former mine property are of potential concern because they are used by the public for recreation, by logging companies for timber harvesting, and by wildlife as habitat. COPCs at OU3 include not only LA, but other mining-related materials that may have been released to the environment. Therefore, the overall objective of phased-based sampling at OU3 is to collect sufficient information to allow evaluation of risks to humans and ecological receptors from exposure to mining-related releases, and to support the development and evaluation of remedial alternatives to address unacceptable risks that are identified. This will occur over multiple, phased sampling events; the findings of each phase of sampling will be used to guide subsequent phases of investigation.

Phase I sampling and analysis was intended to provide initial information on the nature and extent of asbestiform LA and non-asbestos impacts, to identify COPCs to be investigated during the RI, and to begin collection of data to establish a study area boundary for subsequent phases of the RI. Phase I was not expected to provide data that would be sufficient to fully characterize the nature and extent of impacts or to support a risk assessment. Rather, the results of Phase I were intended to provide sufficient information so that a more detailed and extensive sampling effort (Phase II) could be designed for implementation during the 2008 field season.

1.2.2 Phase II Remedial Investigation

The Phase II RI was performed from early April through October 2008 and consisted of three parts:

- Part A: surface water and sediment sampling,

- Part B: groundwater and ambient air sampling, and
- Part C: ecological sampling.

Part A field sampling was performed in accordance with the *Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part A: Surface Water and Sediment* (USEPA 2008a). Part B field sampling was performed in accordance with the *Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part B: Ambient Air and Groundwater* (USEPA 2008b). Part C was performed in accordance with the *Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part C: Ecological Data* (USEPA 2008c).

Parts A and B of the Phase II RI focused on mine-site media sampling specifically, surface water, groundwater, sediments, and ambient air to more fully characterize the nature, extent, and seasonal variation of impacts on the former mine property. Field activities performed under Parts A and B of the Phase II SAP are summarized in the *Field Sampling Summary Report: Phase II Remedial Investigation Operable Unit 3, Part A: Surface Water and Sediment Sampling and Part B: Groundwater and Ambient Air Sampling, Libby Asbestos Superfund Site* (MWH 2009). Part C of the Phase II RI, which is summarized in separate documents, included ecological sampling performed in late September and early October 2008.

1.2.3 Phase III Remedial Investigation

The Phase III RI at OU3 began in early June 2009. Activity-based air sampling (ABS) was conducted in accordance with the *Remedial Investigation for Operable Unit 3, Libby Asbestos Superfund Site. Phase III Sampling and Analysis Plan* (Phase III SAP; USEPA 2009), as amended by field modifications issued by EPA. ABS activities during Phase III focused on simulating the activities of recreational visitors to the forest lands in the vicinity of the former mine. The ABS scripts included ATV riding, hiking, fire-pit preparation, wood gathering, and building and moving about a campfire. Field activities performed under Phase III SAP are summarized in the *Field Sampling Summary Report: Phase III Remedial Investigation Operable Unit 3: Activity Based Sampling* (MWH

2010). Ecological sampling performed at OU3 during the 2009 field season is discussed in a separate document.

1.2.4 2010 Phase IV Part A Remedial Investigation

The 2010 Phase IV RI began in June 2010 with site selection and United States Forest Service (USFS) approval of trees to be harvested during ABS. ABS was conducted in accordance with the *Remedial Investigation for Operable Unit 3, Libby Asbestos Superfund Site. Phase IV Sampling and Analysis Plan Part A – Data to Support Human Health Risk Assessment* (Phase IV SAP; USEPA 2010). The 2010 Phase IV focused on sampling potential exposures of forest users and USFS personnel downwind, northeast, of the former mine operations. The 2010 Phase IV ABS activities included timber harvesting, limbing and cutting felled trees into fireplace lengths, trail clearing and thinning, tree thinning, timber inspection, fire line cutting by both hand and machine, and shed elk horn hunting along Rainy Creek. Field activities performed under Phase IV SAP are summarized in the 2010 *Field Sampling Summary Report: Phase IV Remedial Investigation Operable Unit 3: Activity Based Sampling* (MWH 2011). Ecological sampling performed at OU3 during the 2010 field season is discussed in a separate document.

1.2.5 2011 Phase IV Part B Remedial Investigation

The Phase IV RI continued during the 2011 field season. Sampling performed during the 2011 Phase IV Part B was conducted in accordance with the *Phase IV Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part B: 2011 Surface Water Study* (USEPA 2011) as well as a number of OU3-specific SOPs which can be found on the Libby eRoom site (*https://team.cdm.com/eRoom/mt/LibbyOU3)*. Tasks performed in 2011, under Phase IV Part B, included syringe-surface water sampling as well as annual ISCO surface water monitoring to further evaluate LA concentrations in surface water and to support the ecological risk assessment and characterize fish habitat. ABS performed during the 2011 Phase IV Part B is summarized in the 2011 *Field Sampling Summary Report: Phase IV Part B: Surface Water Sampling* (MWH 2013a).

1.2.6 2012 Phase V Remedial Investigation

Phase V of the RI was performed April through September 2012. Tasks performed in 2012 under Phase V included sampling along the Kootenai River to evaluate potential asbestos loading from Rainy Creek to the Kootenai River and ABS air sampling to evaluate exposure to recreational users (e.g., river guide/fishing). In addition, ABS was performed within OU3 located on Kootenai Development Company land (a restricted area) to evaluate potential asbestos exposures from simulated commercial logging at OU3. This study area represented the high end of the exposures that could potentially occur from commercial logging. Bark and duff samples and ABS air sampling for specific logging activities (i.e., hand-felling, hooking and skidding, mechanical processing, site restoration, and milling processes) were performed.

Field activities and sampling were executed following the protocols established in the *Sampling and Analysis Plan / Quality Assurance Project Plan* (SAP/QAPP) *Operable Unit 3, Libby Asbestos Superfund Site. Phase V, Part A: Kootenai River Surface Water, Sediment, and Activity-Based Sampling* (USEPA 2012a), as well as the *Sampling and Analysis Plan / Quality Assurance Project Plan Operable Unit 3, Libby Asbestos Superfund Site, 2012 Commercial Logging Activity-Based Sampling. Revision 0* (USEPA 2012b). In addition, protocols established in other SOPs were followed as applicable. Sampling performed during the 2012 Phase V is summarized in the 2012 *Field Sampling Summary Report: Phase V Remedial Investigation Operable Unit 3: Activity Based Sampling* (MWH 2013b).

1.2.7 Phase VB-2013 Ecological Remedial Investigation

The Phase VB-2013 Ecological Remedial Investigation, hereafter referred to as 'Phase VB-2013 RI', was the completion of a repeat of the trout eyed egg study conducted in 2012 in accordance with the methods and procedures contained in the *Sampling and Analysis Plan / Quality Assurance Project Plan, Operable Unit 3, Libby Asbestos Superfund Site. Phase V, Part B: 2012 Ecological Investigations (Revision 2)* (USEPA 2012c; see http://www2.epa.gov/region8/libby-asbestos-ou3-final-sapqapp-phase-v-part-b-2012-ecological-investigations) as modified in the *Sampling and Analysis Plan /*

Quality Assurance Project Plan Addendum: Phase V, Part B: Ecological Investigations, Operable Unit 3, Libby Asbestos Superfund Site. 2013 Repeat of In Stream Eyed Egg Study (Revision 0) (USEPA 2013a). The results of this work, which did not identify effects that were attributable to LA, were documented in the *Data Report (Final): 2013 In Situ Westslope Cuttroat Trout Toxicity Study* (Golder 2014) submitted on July 2, 2014.

1.2.8 2013 Wildfire Contingency Monitoring Plan Remedial Investigation

The Wildfire Contingency Monitoring Plan RI, hereafter referred to as the 'Wildfire RI' was conducted in 2013 in accordance with the methods and procedures outlined in the *Sampling and Analysis Plan/Quality Assurance Project Plan, Operable Unit 3, Libby Asbestos Superfund Site, Wildfire Contingency Monitoring Plan, Revision 1* (USEPA 2013b; see http://www2.epa.gov/region8/libby-asbestos-ou3-sapqapp-wildfire-contingency-air-monitoring-plan). The study was performed to evaluate if releases of LA from tree bark and duff due to wildfire suppression efforts could result in the disturbance of LA in source materials thus releasing them into the air. Therefore, air monitoring was deemed necessary to evaluate potential human exposures to airborne LA due to wildfires in OU3. Currently, the results of this work are preliminary and will be documented in a final report pending submittal to the EPA.

1.2.9 2012-2013 Vermiculite Waste Removal Action Characterization Sampling

Vermiculite waste removal and characterization sampling, hereafter referred to as the 'VWRA', commenced in the fall of 2012 and was completed in the summer of 2013. Site preparation, methods, and procedures used for the waste removal and characterization sampling and the SAP/QAPP are presented in the *Work Plan for Removal of Asbestos-Containing Vermiculite Waste Near the "Amphitheater" at Libby Asbestos Superfund Site OU3, Part A: Removal and Disposal of Wastes and Characterization Sampling, Rev. 2* (MWH 2012a) and the *Work Plan for Removal of Asbestos-Containing Vermiculite Waste Near the "Amphitheater" at Libby Asbestos Superfund Site OU3, Part B Sampling and Analysis Plan / Quality Assurance Project Plan* (MWH 2012b); hereafter referred to as the 'Work Plan' in this report. An electronic copy of the SAP/QAPP is located on the

EPA website at http://www2.epa.gov/region8/libby-asbestos-ou3-amphitheater-removal-action-work-plan-part-b-sap-qapp).

Characterization samples were collected after the vermiculite waste removal efforts were completed in 2012 and then again in 2013. Analytical results of samples collected during both 2012 and 2013 are summarized in the *Summary Report for Removal of Asbestos-Containing Vermiculite Waste Near the Amphitheater, Libby Asbestos Superfund Site OU3* (MWH 2013c); hereafter referred to as the 'VWR Summary Report' in this report. An electronic copy of the Final VWR Summary Report is located on the EPA website at http://epaosc.org/site/doc_list.aspx?site_id=9241).

Fifteen total, 30-point composite samples were collected during the 2012 and 2013 removal effort and delivered to the Soil Preparation Facility (SPF) in Troy, Montana as specified in the work plan. Once the soil characterization samples were prepared by the SPF, they were shipped to the EMSL laboratory at Libby for analysis by polarized light microscopy visual estimation (PLM-VE). Analytical laboratory and data quality requirements for this project were in accordance with those detailed in the OU3-specific SOPs as applicable and appropriate, and as modified by special or project-specific requirements issued by EPA.

1.3 PURPOSE OF SAMPLING ACTIVITES

1.3.1 Phase VB-2013 Remedial Investigation

The purpose of completing the in-stream toxicity test study using cutthroat trout eyed eggs was to evaluate if exposure of trout eggs or fry to LA in Lower Rainy Creek (LRC) presents an unacceptable ecological risk. The primary objective of this study, as well as other ecological studies conducted within OU3, was to gather data to support a baseline ecological risk assessment for OU3.

1.3.2 Wildfire Remedial Investigation

The purpose of conducting the Wildfire RI study was to collect samples during and after a forest fire within OU3 to gather data to support the human health risk assessment. Forest fires in OU3 that disturb contaminated environmental media have the potential to

release LA into the air. This is of concern because people may potentially inhale released LA fibers. In addition, the study measured LA concentrations in ash following the wildfire which could provide information on the potential for subsequent exposures to human or ecological receptors. Mitigation measures may be necessary to try to minimize potential affects, depending upon the level of LA in ash.

1.3.3 Vermiculite Waste Removal Action

While doing site reconnaissance for Rainy Creek, in October 2011, as part of a preliminary evaluation of potential site interim removal scenarios, potential asbestos-containing vermiculite waste material was discovered south of, and below, the Amphitheater at OU3. The Amphitheater is a portion of the site used for staging soil removed from OU4 prior to transport to the top of the former mine for placement. The waste vermiculite area was identified as a potential source of elevated LA levels detected in LRC because Rainy Creek was flowing through the area where the waste material was located. The purpose of the VWRA was to eliminate or mitigate this potential continuing source of LA to LRC by excavating and transporting the asbestos-containing material to the disposal area at the top of the former mine and to characterize the soil left in place, see **Figure 1-2**.

1.3.4 Continuous Flow Monitoring (ISCO)

Annual monitoring of creek flow in the Rainy Creek watershed was performed with ISCO samplers. Refer to **Figure 1-2** for ISCO locations. Flow measurements are described in Section 2.4.

1.4 PROJECT ORGANIZATION

1.4.1 Project Management

EPA is the lead regulatory agency for Superfund activities within OU3. The EPA Remedial Project Manager (RPM) for OU3 remedial investigations addressed in this report is Ms. Christina Progess of EPA Region 8. Ms. Progess is a principal data user and decision-maker for Superfund activities within OU3.

The Montana Department of Environmental Quality (MDEQ) is the support regulatory agency for Superfund activities within OU3. The MDEQ Project Manager for OU3 is Carolyn Rutland. EPA consults with MDEQ as provided for by CERCLA, the National Contingency Plan, and applicable guidance in conducting Superfund activities at OU3.

The designated Project Coordinator for the Respondents is Mr. Robert Medler of W.R. Grace & Co.-Conn.

1.4.2 Technical Support

The EPA and W.R. Grace were supported in these projects by contractors, including:

- CDM Smith (CDM)
- Golder
- MWH Americas, Inc. (MWH)
- Chapman Construction
- HDR, Inc. (HDR)

1.4.3 Field Activity Support and Implementation

The 2013 field sampling activities were performed by Grace with support from CDM, Golder, and Chapman Construction for RI-related activities and MWH and Chapman Construction for the VWRA in accordance with the approved SAPs.

Individuals responsible for implementation of the OU3 2013 Phase VB-2013 RI sampling can be found in the final study data report submitted on July 2, 2014 (Golder 2014).

All field collection activities performed during the Wildfire RI event were performed by Grace and their contractors, in strict accordance with the SAP/QAPP (USEPA 2013b). Grace was supported in this field work by Chapman Construction.

Individuals responsible for implementation of the OU3 2012-2013 Vermiculite Waste Removal sampling program are listed below:

- MWH Project Manager/Field Supervisor: John Garr and Jesse Stewart

- MWH Field Quality Control (QC)/Health and Safety Officer: Emily Yeager
- MWH Quality Assurance Officer: Mike DeDen
- Chapman Construction Point-of-Contact: Mike Chapman

1.4.4 Sample Preparation and Analysis

All samples collected as part of the OU3 field efforts were submitted to an EPA-selected/approved laboratory for preparation and/or analysis.

1.4.5 Data Management

Administration of the OU3 master database is performed by EPA contractors. The primary database administrator is Lynn Woodbury of CDM. Ms. Woodbury is responsible for sample tracking, uploading new data, performing error checks to identify inconsistent or missing data, and ensuring that all questionable data are checked and corrected, as needed.

2.0 SAMPLING PROGRAM

2.1 SUMMARY OF THE PHASE VB-2013 ECOLOGICAL REMEDIAL INVESTIGATION SAMPLING PROGRAM ACTIVITES

Phase VB-2013 of the RI was performed during the 2013 field season (May and June). In summary, Whitlock-Vibert Boxes (WVBs), each containing 30 cutthroat trout eggs at the eyed stage, were deployed at OU3 in three locations (two WVBs per location) within LRC and two WVBs with eggs were also deployed at each of two reference creeks: Noisy Creek (NSY) and Upper Rainy Creek (URC). The WVBs were "modified" from the design used in the 2012 study as discussed in the 2013 Phase VB SAP Addendum (USEPA 2013a) to eliminate escapement of the young alevins, the entry of predacious invertebrates, and increase the in situ monitoring frequency. The swim test of the young alevins also was modified from the design in the 2012 study design (USEPA 2013a). The results of this were documented in the Final Study Data Report submitted on July 2, 2014 (Golder 2014). This report contains all tables and figures, the field sampling data sheet (FSDS), field notes, and chain-of-custody (COC) forms.

2.2 SUMMARY OF 2013 WILDFIRE REMEDIAL INVESTIGATION SAMPLING PROGRAM ACTIVITES

The Wildfire RI was performed in July through August during the 2013 field season. Currently the USFS has established a Fire Suppression Restriction Zone (FSRZ) boundary, which coincides with the OU3 study boundary, and has determined that ground-based firefighters must wear respiratory protection when attacking fires.

Tasks performed included sampling included air monitoring during a forest fire, as well as ash sample collection following the fire within OU3. All sampling was conducted in accordance with the SAP/QAPP (USEPA 2013b). The sampling activities and results of this study are pending submittal to the EPA. The report will contain all tables and figures, the FSDS, field notes, and COC forms.

2.3 SUMMARY OF 2012-2013 VERMICULITE WASTE REMOVAL ACTION SAMPLING ACTIVITIES

Tasks performed during the removal action included collection of composite characterization samples at designated areas where removal activities occurred and submittal to the SPF for preparation for asbestos analysis. All sample locations were recorded in field log books and entered into the global positioning system (GPS). Over the 2013/2013 removal effort, 15 total, 30-point composite samples were collected and delivered to the SPF in Troy, Montana. Once the soil characterization samples were prepared by the SPF, the samples were shipped to the EMSL laboratory at Libby for analysis by PLM-VE. Analytical laboratory and data quality requirements for this project were in accordance with those detailed in the OU3-specific SOPs, as applicable and appropriate, and as modified by special or project-specific requirements issued by EPA. After the removal action was completed, under oversight provided by HDR under contract to EPA, the site was backfilled with clean material and vegetated.

2.4 CONTINUOUS FLOW MONITORING (ISCO)

Annual stream flow records were collected using ISCO automated flow recorders installed at locations LRC-06, LRC-02 and CC-02 during the freeze-free part of the year, from April through November. The flow records are presented in graphical form on **Figure 2-1**. The 2013 raw flow data can be found on the Libby eRoom site (*https://team.cdm.com/eRoom/mt/LibbyOU3/0_cfaf*). The flow data collected at LRC-06 were monitored to provide assurance that the surface water samples were representative of high flow conditions within Rainy Creek.

2.5 SAMPLE COLLECTION METHODS

2.5.1 Phase VB-2013 Sample Collection

Samples were collected as described in the 2013 Phase VB SAP Addendum (USEPA 2013a) and in the Final Study Data Report (Golder 2014).

2.5.2 Wildfire Sample Collection

Samples were collected as described in the Wildfire SAP/QAPP (USEPA 2013b).

2.5.3 Vermiculite Waste Removal Action Sample Collection

Soil samples were collected, handled, and documented in basic accordance with the procedures specified in OU3-specific SOP No. 1, Soil Sampling for Non-Volatile Organic Compound Analysis with the following project-specific modifications:

- Each composite soil sample comprised 30 individual sampling points that were approximately equidistant from each other and representative of the approximate 15,000 square foot cell established within the area designated for the removal action.
- At each sampling point, approximately 50 grams of material were collected such that the total mass of soil material for the composite sample filled about 1/3 of a gallon-sized zip-top bag.

2.6 GLOBAL POSITION SYSTEM COORDINATE COLLECTION

GPS coordinates were recorded for each sampling station/location in basic accordance with the procedures specified in OU3-specific SOP No. 11, *GPS Data Collection*.

2.7 SAMPLING EQUIPMENT

Sampling equipment, instrumentation, and handling devices used during each sampling event are detailed in the associated SAPs and Final Reports. The following list includes a majority of the equipment required:

- Phase VB-2013 Ecological Sampling
  - Whitlock-Vibert boxes
  - 500-mililiter high density polyethylene (HDPE) wide-mouth bottles
  - Transect stainless steel sample pipe with plug
  - Pre-numbered self-adhesive sample identification labels
- Wildfire Phase ABS Air Sampling

  - Air sampling pump: SKC model AirChek XR5000™ (0.005 – 5.0 liters per minute; L/min)
  - Sample cassette: 25mm 0.8-micron pore size, conductive, cowled MCE cassettes
  - Inert tubing: Tygon™ R-3603 tubing, 1/4" inner diameter and 7/16" outer diameter
  - Primary calibrator: BIOS Intl. DryCal DC-Lite™ model MH (0.2 – 17 LPM)
- VWRA Characterization Soil Samples
  - Zip-top bags
  - Disposable stainless steel spoons
  - Pre-numbered self-adhesive sample identification labels
- Field Documentation (applies to all sampling events)
  - Chain of Custody sheets
  - FSDSs
  - Field logbook and indelible pens/markers
  - GPS Unit
  - Digital Camera with dry-erase placard
- Sample Handling (applies to all sampling events)
  - Sample Storage: Vendor-supplied, partitioned filter cassette shipping boxes for air samples
  - Sample shipping: Small insulated plastic coolers with integrated handles on top to make sure the container remained upright during shipping (during hand-delivery to the SPF for the Vermiculite Waste Removal Action).
  - Custody seals
  - Shipping labels

2.8 QUALITY CONTROL SAMPLES

Quality control samples were collected during the sampling events as per event specific SAP direction (i.e., lot blanks, field duplicates, and field blanks).

2.8.1 Phase VB-2013 Quality Control Samples

Quality control samples were collected as described in the 2013 Phase VB SAP Addendum (USEPA 2013a) and in the Final Study Data Report (Golder 2014).

2.8.2 Wildfire Quality Control Samples

Quality control samples were collected as described in the Wildfire SAP/QAPP (USEPA 2013b).

2.8.3 Vermiculite Waste Removal Action Quality Control Samples

One Field Duplicate sample was collected as per the SAP/QAPP for analysis during the VWRA. Environmental and QC samples are summarized in **Table 2-1**. Complete analytical data reports are available on CDM eRoom for Libby OU3 (https://team.cdm.com/eRoom/mt/LibbyOU3).

2.9 SAMPLE IDENTIFICATION, HANDLING AND ANALYSIS

2.9.1 Sample Identification

2.9.1.1 VB-2013 Sampling

Field data observed during collection of each sample were documented by field personnel on the OU3 VB-2013 FSDSs. At the time of collection, each sample was labeled with a unique sequential index identification number (index ID). The index IDs for samples collected have a prefix of “P5” (e.g., P5-20297). Information on whether the sample is representative of a field sample or a field-based QC sample was documented on the FSDS, but was not included on the chain-of-custody, to make sure that the sample type was unknown to the analytical laboratory. Field personnel maintained a field logbook with sequentially numbered, non-removable pages. All potentially relevant information not recorded on the FSDS forms was recorded in the field logbook. FSDS forms and the field logbook are included in the Final Study Data Report (Golder 2014).

2.9.1.2 Wildfire Sampling

Field data observed during collection of each sample were documented by field personnel on the OU3 Wildfire FSDSs. At the time of collection, each sample was labeled with a unique sequential index ID. The index IDs for samples collected have a prefix of "SM" (e.g., P5-10060). Information on whether the sample is representative of a field sample or a field-based QC sample was documented on the FSDS, but was not included on the chain-of-custody, to make sure that the sample type was unknown to the analytical laboratory. Field personnel maintained a field logbook with sequentially numbered, non-removable pages. All potentially relevant information not recorded on the FSDS forms was recorded in the field logbook. FSDS forms and the field logbook are will be included in the final report pending submittal to the EPA.

2.9.1.3 Vermiculite Waste Removal Action Sampling

Field data observed during collection of each sample were documented by field personnel on the OU3 vermiculite waste removal-specific FSDSs. At the time of collection, each sample was labeled with a unique sequential index ID. The index IDs for samples collected as part of the 2012/2013 Vermiculite Waste Removal effort have a prefix of "VW" (e.g., VW-1-01, VW-1-02). Information on whether the sample is representative of a field sample or a field-based QC sample was documented on the FSDS, but was not included on the chain-of-custody, to make sure that the sample type was unknown to the analytical laboratory. Field personnel maintained a field logbook with sequentially numbered, non-removable pages. All potentially relevant information not recorded on the FSDS forms was recorded in the field logbook. Scans of the FSDS forms and logbook are contained in Appendix C of the Final VWR Summary Report (see http://epaosc.org/site/doc_list.aspx?site_id=9241).

2.9.2 Sample Chain-Of-Custody and Shipment

2.9.2.1 VB-2013 Sampling

A COC was maintained until final disposition of the samples by the laboratory and acceptance of analytical results. Original COCs accompanied the samples from the site

to the SPF; copies were made and retained to document each COC. Scans of the COCs are included in the Final Study Data Report (Golder 2014).

2.9.2.2 Wildfire Sampling

A COC was maintained until final disposition of the samples by the laboratory and acceptance of analytical results. Original COCs accompanied the samples from the site to the EMSL; copies were made and retained to document each COC. Scans of the COCs will be included in the final report pending submittal to the EPA.

2.9.2.3 Vermiculite Waste Removal Action Sampling

A COC was maintained until final disposition of the samples by the laboratory and acceptance of analytical results. Original COCs accompanied the samples from the site to the SPF; copies were made and retained to document each COC. Scans of the COCs are contained in Appendix C of the Final VWR Summary Report (see http://epaosc.org/site/doc_list.aspx?site_id=9241).

2.9.3 Sample Analysis

2.9.3.1 VB-2013 Sampling

A number of measurement endpoints were evaluated in order to interpret the ecological data as discussed in the in the Final Study Data Report (Golder 2014).

In addition, all water samples collected from LRC and the reference locations were analyzed for total LA using transmission electron microscopy (TEM). Samples were delivered to SPF for preparation prior to submittal of the samples to the EMSL laboratory. Analytical laboratory and data quality requirements for this project were in accordance with those detailed in the OU3-specific SOPs.

2.9.3.2 Wildfire Sampling

All air monitoring and ash samples collected during the Wildfire RI sampling event were analyzed for total LA using TEM. Samples were delivered to the EMSL laboratory. Analytical laboratory and data quality requirements for this project were in accordance with those detailed in the OU3-specific SOPs.

2.9.3.3 Vermiculite Waste Removal Action Sampling

Samples were delivered to SPF for preparation prior to submittal of the samples to the EMSL laboratory at Libby for analysis by PLM-VE. Analytical laboratory and data quality requirements for this project were in accordance with those detailed in the OU3-specific SOPs.

2.10 HEALTH AND SAFETY

"Tailgate" safety meetings were conducted at the start of each work day. Bear deterrent spray, first-aid kits, cooling vests, and water were made available for use during project work.

3.0 REFERENCES

Golder (Golder Associates Inc.). 2014. Data Report (Final): 2013 In Situ Westslope Cuttroat Trout Toxicity Study. Operable Unit 3, Libby Asbestos Superfund Site, Montana. Prepared for and submitted to: W.R. Crace & Co. – Conn. Golder. July 2, 2014.

MWH Americas, Inc. (MWH). 2007. Field Sampling Summary Report: Phase I Remedial Investigation Operable Unit 3, Libby Asbestos Superfund Site. MWH. December, 2007.

MWH. 2009. Field Sampling Summary Report: Phase II Remedial Investigation Operable Unit 3, Part A: Surface Water and Sediment Sampling and Part B: Groundwater and Ambient Air Sampling, Libby Asbestos Superfund Site. MWH. February, 2009.

MWH. 2010. Field Sampling Summary Report: Phase III Remedial Investigation Operable Unit 3: Activity Based Sampling. MWH. January, 2010.

MWH. 2011. Field Sampling Summary Report: Phase IV Remedial Investigation Operable Unit 3: Activity Based Sampling. MWH. January, 2011.

MWH. 2012a. Work Plan for Removal of Asbestos-Containing Vermiculite Waste Near the Amphitheater at Libby Asbestos Superfund Site OU3, Part A Removal and Disposal of Wastes and Characterization Sampling, Rev.2. U.S. EPA, Region 8. September, 2012

MWH. 2012b. Work Plan for Removal of Asbestos-Containing Vermiculite Waste Near the Amphitheater at Libby Asbestos Superfund Site OU3, Part B Sampling and Analysis Plan / Quality Assurance Project Plan. U.S. EPA, Region 8. September, 2012.

MWH. 2013a. Field Sampling Summary Report: Phase IV Part B Remedial Investigation Operable Unit 3: Surface Water Sampling. MWH. January, 2013.

MWH. 2013b. Field Sampling Summary Report : Phase V Remedial Investigation Operable Unit 3: Activity Based Sampling. MWH. February, 2013.

MWH. 2013c. Summary Report for Removal of Asbestos-Containing Vermiculite Waste Near the Amphitheater at Libby Asbestos Superfund Site OU3. MWH. September, 2013.

U.S. EPA (U.S. Environmental Protection Agency). 2007. Phase I Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site. U.S. EPA, Region 8. September 26, 2007.

U.S. EPA. 2008a Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part A: Surface Water and Sediment. U.S. EPA, Region 8. May 29, 2008.

U.S. EPA. 2008b. Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part B: Ambient Air and Groundwater. U.S. EPA, Region 8. July 2, 2008.

U.S. EPA. 2008c. Phase II Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Site, Part C: Ecological Data. U.S. EPA, Region 8. September 17, 2008.

U.S. EPA. 2009. Remedial Investigation for Operable Unit 3, Libby Asbestos Superfund Site. Phase III Sampling and Analysis Plan. U.S. EPA, Region 8. May 26, 2009.

U.S. EPA. 2010. Remedial Investigation for Operable Unit 3, Libby Asbestos Superfund Site. Phase IV Sampling and Analysis Plan Part A – Data to Support Human Health Risk Assessment. U.S. EPA, Region 8. June 14, 2010

U.S. EPA. 2011. Phase IV Sampling and Analysis Plan for Operable Unit 3, Libby Asbestos Superfund Site, Part B: 2011 Surface Water Study. U.S. EPA, Region 8. April 4, 2011.

U.S. EPA. 2012a. Sampling and Analysis Plan/Quality Assurance Project Plan. Operable Unit 3, Libby Asbestos Superfund Site. Phase V, Part A: Kootenai River Surface Water, Sediment, and Activity-Based Sampling. U.S. EPA, Region 8. May 22, 2012

U.S. EPA. 2012b. Sampling and Analysis Plan/Quality Assurance Project Plan, Operable Unit 3, Libby Asbestos Superfund Site, 2012 Commercial Logging Activity-Based Sampling. Revision 0. U.S. EPA, Region 8. August, 2012.

U.S. EPA. 2012c. Sampling and Analysis Plan / Quality Assurance Project Plan, Operable Unit 3, Libby Asbestos Superfund Site. Phase V, Part B: 2012 Ecological Investigations (Revision 2). U.S. EPA, Region 8. July 2012.

U.S. EPA. 2013a. Sampling and Analysis Plan / Quality Assurance Project Plan Addendum: Phase V, Part B: Ecological Investigations, Operable Unit 3, Libby Asbestos Superfund Site. 2013 Repeat of In Stream Eyed Egg Study (Revision 0). U.S. EPA, Region 8. April, 2013.

U.S. EPA. 2013b. Sampling and Analysis Plan/Quality Assurance Project Plan, Operable Unit 3, Libby Asbestos Superfund Site, Wildfire Contingency Monitoring Plan. Revision 1. U.S. EPA, Region 8. August, 2013.

OU3-Specific SOP's. are located at: https://team.cdm.com/eRoom/mt/LibbyOU3

TABLES

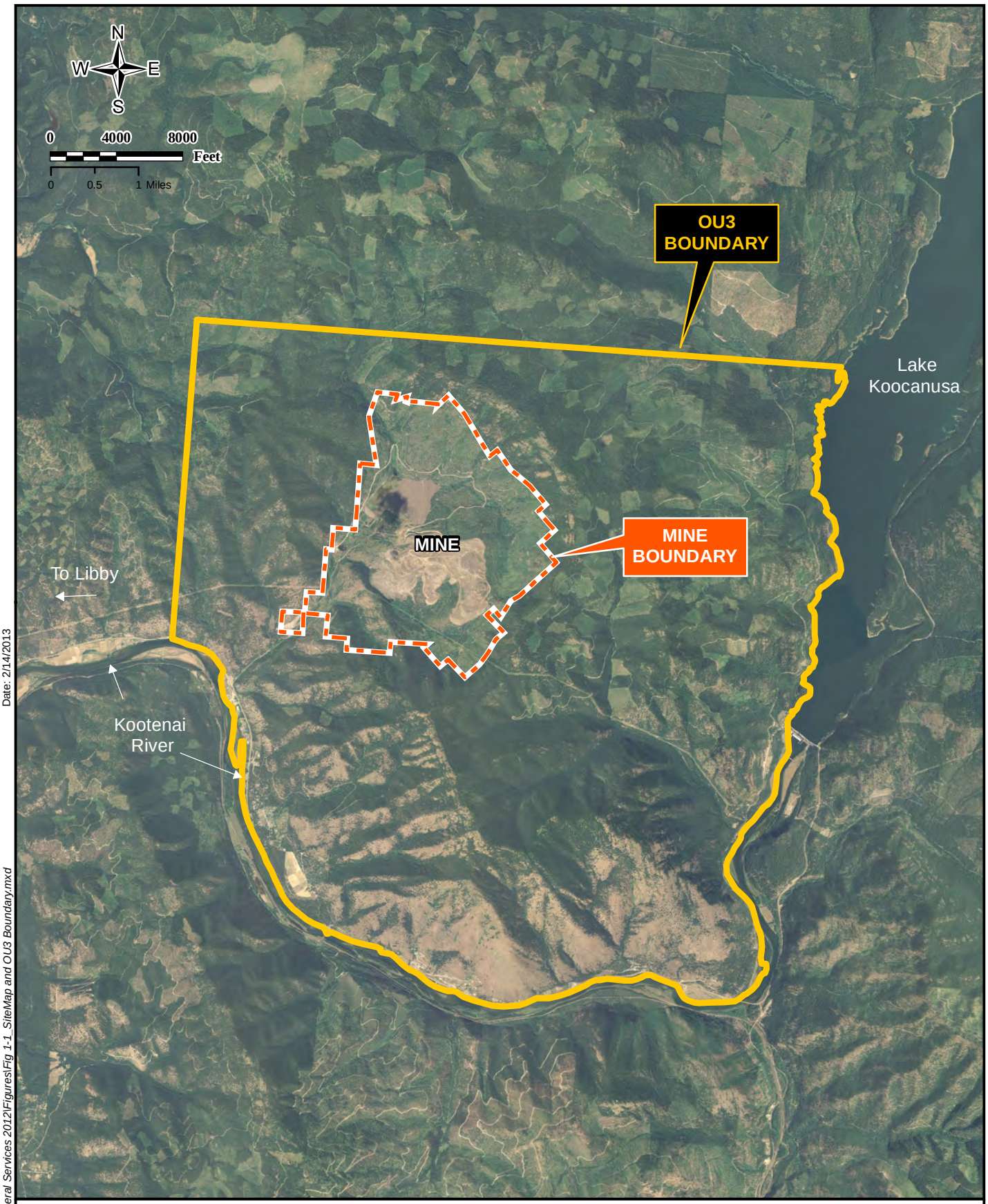
Table 2-1
Vermiculite Waste Characterization Sample Details and Results

Sample Number	Sample Date	Sample Type	Analytical Results - % LA	Number of composite points with visible VW present	Number of composite points without visible VW present	Northing[b]	Easting[b]
VW-1-01	26-Sep-12	30 point composite surface soil	<1	11	19	5365781	0615838
VW-1-02	26-Sep-12	30 point composite surface soil	<1	14	16	5365789	0615874
VW-1-03	26-Sep-12	30 point composite surface soil	<1	11	19	5365785	0615899
VW-1-04	26-Sep-12	30 point composite surface soil	<1	12	18	5365754	0615859
VW-1-05	26-Sep-12	30 point composite surface soil	TR	16	14	5365756	0615879
VW-1-06	26-Sep-12	30 point composite surface soil	<1	15	15	5365757	0615879
VW-1-07	25-Jun-13	30 point composite surface soil	1	11	19	5365631	0615867
VW-1-08	25-Jun-13	30 point composite surface soil	<1	16	14	5365695	0615877
VW-1-09	25-Jun-13	30 point composite surface soil	<1	21	9	5365692	0615909
VW-1-010	25-Jun-13	30 point composite surface soil	2	18	12	5365643	0615895
VW-1-011	25-Jun-13	30 point composite surface soil	<1	19	11	5365605	0615872
VW-1-012	25-Jun-13	30 point composite surface soil	<1	16	14	5365646	0615874
VW-1-013	28-Jun-13	30 point composite surface soil	<1	17	13	5365694	0615876
VW-1-014	28-Jun-13	30 point composite surface soil	2	15	15	5365740	0615913
VW-1-015	9-Jul-13	30 point composite surface soil	2	10	20	5365756	0615845
VW-1-018[a]	28-Jun-13	30 point composite surface soil	<1	16	14	5365694	0615876

[a] Field duplicate sample of VW-1-013
[b] Coordinate system UTM 11U

LA Libby Amphibole
TR Trace
VW Vermiculite Waste

FIGURES



Date: 2/14/2013

FILE: I:\LIBBY_MONTANA\General Services 2012\Figures\Fig 1-1_SiteMap and OU3 Boundary.mxd

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LIBBY ASBESTOS SUPERFUND SITE

LOCATION OF MINE SITE AND PRELIMINARY OU3 STUDY BOUNDARIES

FIGURE 1-1

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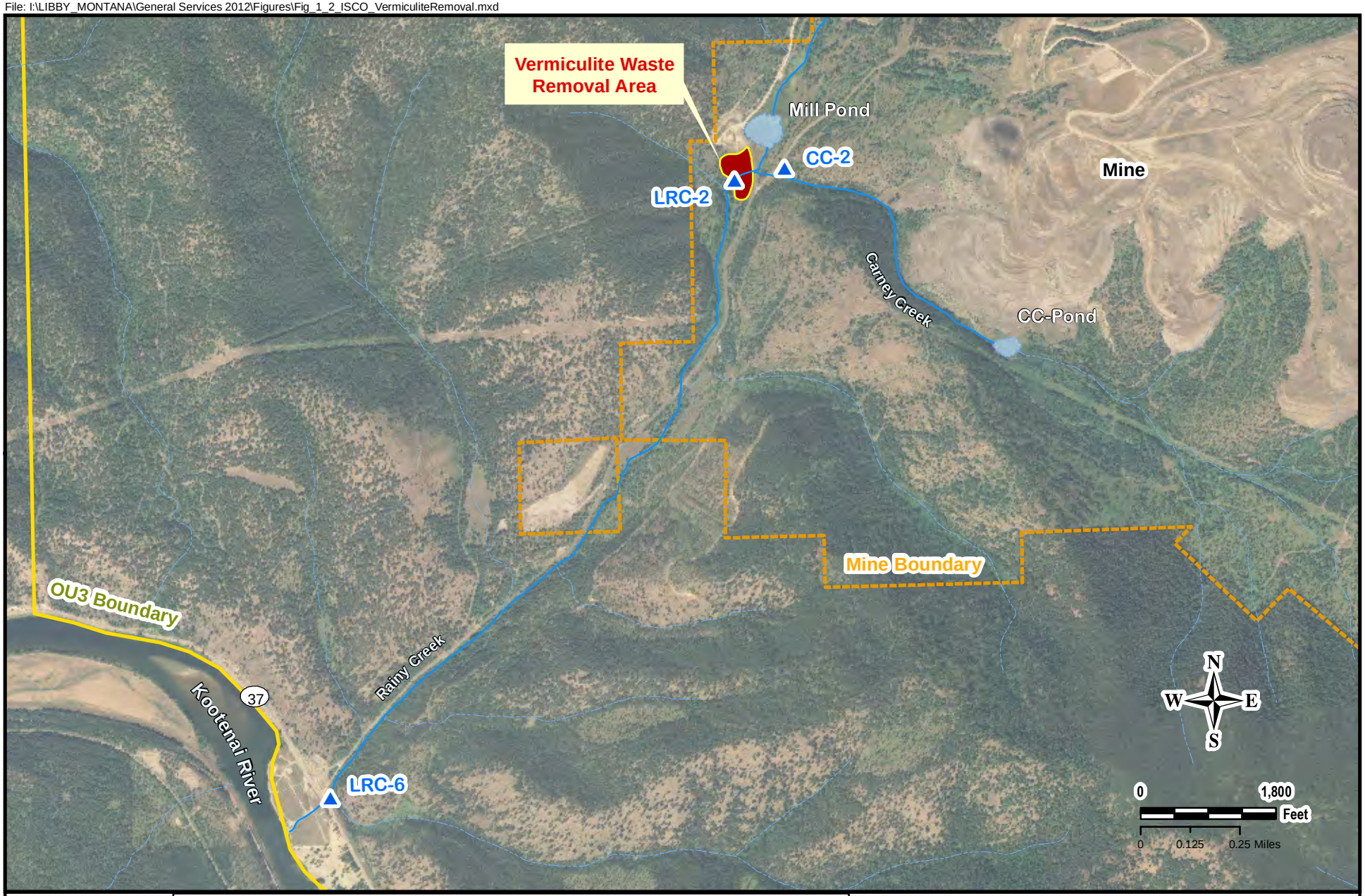

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EXPLANATION

- Creek
- Intermittent streams
- ISCO Locations
- Ponds
- Vermiculite Waste Removal Area

LIBBY ASBESTOS SUPERFUND SITE

ISCO and VERMICULITE WASTE REMOVAL AREA

FIGURE 1-2

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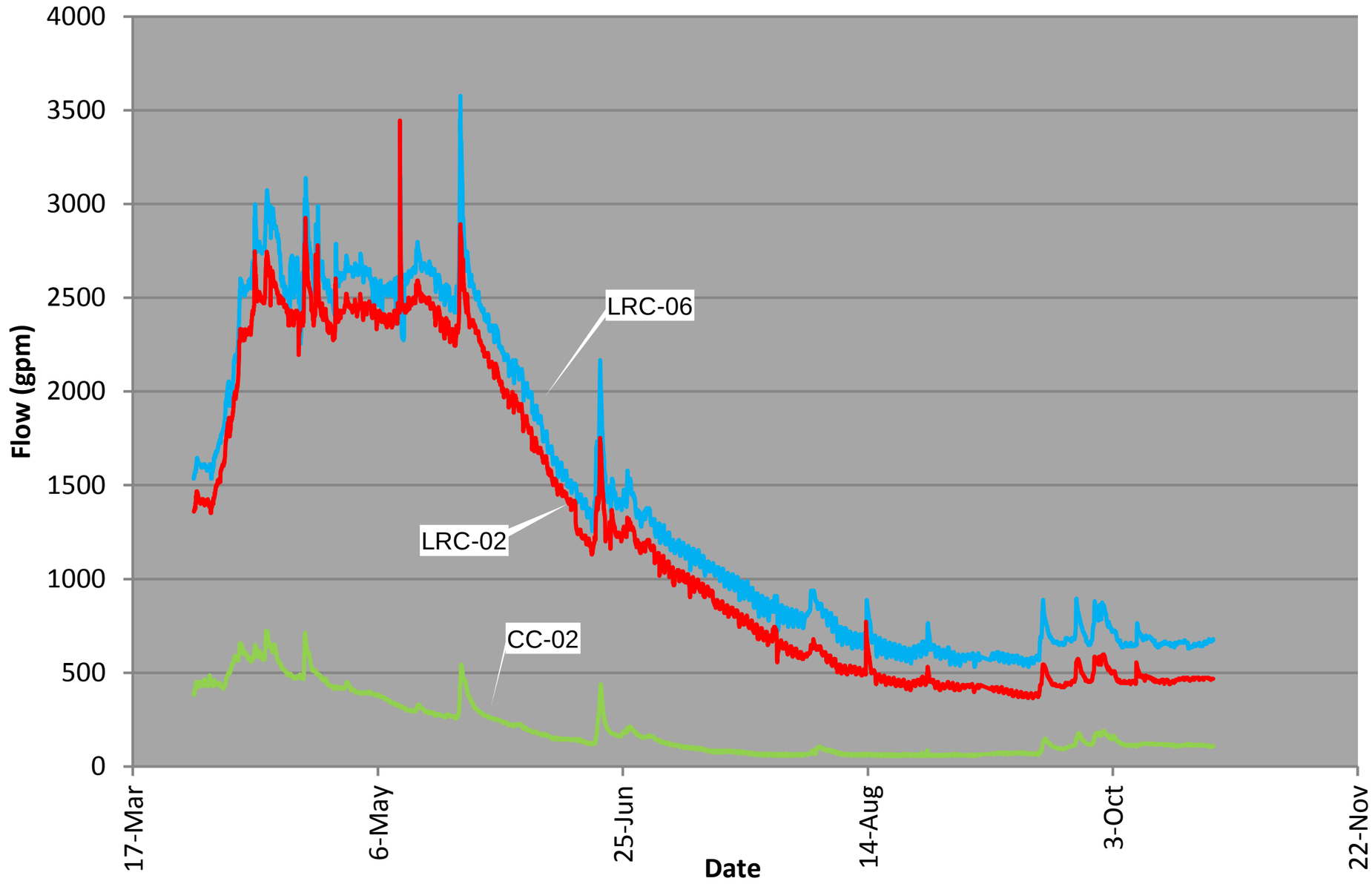

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EXPLANATION

Flow Stations

CC-02

LRC-02

LRC-06

LIBBY ASBESTOS SUPERFUND SITE

OU3 2013 ISCO
Stream Flow Data

FIGURE 2-1