UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 8

IN THE MATTER OF:
Libby Asbestos Site, OU 3
Libby Montana

W.R. Grace & Co. – Conn. and
Kootenai Development Corporation,

Respondents

ADMINISTRATIVE SETTLEMENT
AGREEMENT AND ORDER ON
CONSENT FOR REMOVAL ACTION

U.S. EPA Region 8
CERCLA Docket No. **CERCLA-08-2012-0004**

Proceeding Under Sections 104, 106(a), 107
and 122 of the Comprehensive
Environmental Response, Compensation,
and Liability Act, 42 U.S.C. §§ 9604,
9606(a), 9607 and 9622

[TABLE OF CONTENTS]

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent (Settlement Agreement) is entered into voluntarily by the United States Environmental Protection Agency (EPA) and W.R. Grace & Co. – Conn. and Kootenai Development Company (Respondents). This Settlement Agreement provides for the performance of a removal action by Respondents and the payment of certain response costs incurred by the United States at or in connection with the Libby Asbestos Site (Site), Operable Unit 3 (OU 3), generally located at Libby, Lincoln County, Montana.

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622 (CERCLA).

3. EPA has notified the State of Montana of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. EPA and Respondents recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondents agree to comply with and be bound by the terms of this Settlement Agreement and further agree that they will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon EPA and upon Respondents and their successors and assigns. Any change in ownership or corporate status of a Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Settlement Agreement.

6. Respondents are jointly and severally liable for carrying out all activities required by this Settlement Agreement. In the event of the insolvency or other failure of any Respondent to implement the requirements of this Settlement Agreement, the remaining Respondent shall complete all such requirements.

7. Respondents shall ensure that their contractors, subcontractors, and representatives receive a copy of this Settlement Agreement and comply with this Settlement Agreement. Respondents shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

8. Unless otherwise expressly provided in this Settlement Agreement, terms used in this Settlement Agreement that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"Action Memorandum Amendment" shall mean the EPA Action Memorandum Amendment relating to OU3 of the Site signed on August 31, 2012, and all attachments thereto. The Action Memorandum Amendment is attached as Appendix A.

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675.

"Day" shall mean a calendar day. In computing any period of time under this Settlement Agreement, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next working day.

"Effective Date" shall mean the effective date of this Settlement Agreement as provided in Section XXXII.

"EPA" shall mean the U.S. Environmental Protection Agency and its successor departments, agencies, or instrumentalities.

"EPA Hazardous Substance Superfund" shall mean the Hazardous Substance Superfund established by the Internal Revenue Code, 26 U.S.C. § 9507.

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports, and other deliverables pursuant to this Settlement Agreement, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement, including but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Paragraph 59 (including, but not limited to, costs and attorneys fees and any monies paid to secure access, including, but not limited to, the amount of just compensation), and Paragraph 69 (emergency response). Future Response Costs shall also include Agency for Toxic Substances and Disease Registry (ATSDR) costs regarding the Site.

"Grace" shall mean W.R. Grace & Co. – Conn. (known as W.R. Grace & Co. from 1963 to 1988), a Respondent under this Settlement Agreement.

"Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest

shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

"KDC" shall mean Kootenai Development Company.

"MDEQ" shall mean the Montana Department of Environmental Quality and any successor departments or agencies of the State.

"Mine" shall mean the Zonolite Vermiculite Mine located near Libby, Montana.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"OU 3" shall mean operable unit 3 of the Site which includes property in and around the Zonolite Vermiculite Mine owned by Grace or Grace-owned subsidiaries (excluding OU2) and any area (including any structure, soil, air, water, sediment or receptor) impacted by the release and subsequent migration of hazardous substances and/or pollutants or contaminants from such property, including, but not limited to, the mine property, the Kootenai River and sediments therein, Rainy Creek, Rainy Creek Road and areas in which tree bark is contaminated with such hazardous substances and/or pollutants and contaminants.

"Paragraph" shall mean a portion of this Settlement Agreement identified by an Arabic numeral or an upper or lower case letter.

"Parties" shall mean EPA and Respondents.

"RCRA" shall mean the Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992 (also known as the Resource Conservation and Recovery Act).

"Respondents" shall mean W.R. Grace & Co.- Conn., and Kootenai Development Company.

"Section" shall mean a portion of this Settlement Agreement identified by a Roman numeral.

"Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all appendices attached hereto (listed in Section XXXI). In the event of conflict between this Administrative Settlement Agreement and Order on Consent and any appendix, this Administrative Settlement Agreement and Order on Consent shall control.

"Site" shall mean the Libby Asbestos Superfund Site located in and around Libby, Montana, including those areas in which vermiculite was handled, processed or on which amphibole asbestos otherwise came to be located.

"Libby Asbestos Site Special Account - OU 3" shall mean the special account, within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

"State" shall mean the State of Montana.

"United States" shall mean the United States of America and each department, agency, and instrumentality of the United States, including EPA.

"Waste Material" shall mean (a) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (b) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and (c) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

"Work" shall mean all activities Respondents are required to perform under this Settlement Agreement except those required by Section XII (Record Retention).

"Work Plan" shall mean the work plan for the implementation of the Action Memorandum Amendment attached hereto as Appendix B.

IV. FINDINGS OF FACT

9. In the late 1800s, gold miners discovered a significant body of vermiculite ore in an area located in the mountains about seven miles northeast of the town of Libby, Montana.

10. From 1963 to 1990 Grace mined and beneficiated (through milling) vermiculite ore at the Mine, separating some non-vermiculite materials from the vermiculite ore. The beneficiated vermiculite ore was known as vermiculite concentrate.

11. One of the minerals found in the vermiculite deposits near Libby is tremolite, which is a form of asbestos in the amphibole family. There is also non-asbestiform tremolite in the Libby vermiculite deposit.

12. Libby vermiculite ore deposits contain measurable quantities of amphibole asbestos.

13. While much of the asbestos in the Libby vermiculite deposit was removed from the vermiculite in the mining, milling and screening process, the vermiculite concentrate (processed but unexpanded vermiculite) that was transported to expanding plants had an asbestos content of up to 5%.

14. From 1963 until 1990, Grace operated a screening plant, a processing plant at which vermiculite concentrate was separated into different grades through a mechanical screening process.

15. Prior to the mid-1970s, a screening plant was located at the Mine.

16. After the mid-1970s, the screening plant was located down Rainy Creek Road from the Mine, at the intersection of Highway 37 and Rainy Creek Road on the bank of the Kootenai River, about four miles from Libby, partially located on the Flyway.

17. Prior to the construction of the new screening plant at that location, the property at the intersection of Highway 37 and Rainy Creek Road was used as a holding point for vermiculite concentrate trucked from the screening plant at the Mine.

18. From 1963 to 1990, Grace transported, screened, and sized vermiculite concentrate from the property at the intersection of Highway 37 and Rainy Creek Road across the Kootenai River by conveyer belt to a rail loading station where it was placed in bulk in rail hopper cars for distribution to customers and processing facilities in other states.

19. In the operation of the screening plant, there were occasionally spills, processing errors, or lack of demand for certain size grades of vermiculite concentrate.

20. At various times between 1963 and 1990, the vermiculite concentrate that had spilled, vermiculite concentrate that was affected by processing errors, or vermiculite concentrate of a grade for which there was no immediate demand was placed in various outdoor locations on the grounds of the screening plants where it was open to the environment.

21. In 1990, Grace ceased vermiculite mining and processing operations in Libby.

22. In the mid-1990s, Grace sold several of the properties associated with its former vermiculite operations in and near Libby.

23. In 1994 Grace sold portions of OU3 to KDC including the Mine.

24. KDC was aware of the presence of asbestos at the Mine at the time it purchased that property in the mid-1990s.

25. In 2000 Grace purchased a controlling interest in KDC.

26. On April 2, 2001, Respondents each commenced voluntary chapter 11 Bankruptcy cases in the Unites States Bankruptcy Court for the District of Delaware entitled W. R. Grace & Co., et al, jointly administered under Case No. 01-01139 and have been operating their businesses as debtors in possession under chapter 11 of the Bankruptcy Code since that time.

27. EPA's investigations have shown that human activities which disturb soils contaminated with amphibole asbestos may result in exposures to airborne fibers. Thus, people who have been, or may be in the future, involved in certain activities within OU 3 may be exposed to airborne fibers.

28. The State requested EPA to list the Libby Asbestos Site on the National Priorities List as the State's top priority site pursuant to 42 U.S.C. § 9605(a)(8)(B) and 40 C.F.R. § 300.425(c)(2). See 67 Fed. Reg. 8836, 8839 (Feb. 26, 2002).

29. On October 24, 2002 EPA listed the Libby Asbestos Site on the National Priorities List. See 67 Fed. Reg. 65,315 (Oct. 24, 2002).

30. Test results indicated elevated levels of asbestos contamination at the Site. See Action Memoranda 5-23-00 and 8-17-01.

31. Pursuant to an Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (CERCLA-08-2007-0012). Respondents have been performing a remedial investigation at OU 3.

32. Levels of asbestos fibers that may periodically exceed federal drinking water maximum contaminant levels and Montana water quality standards have been observed in surface water at OU 3.

33. Asbestos-containing waste vermiculite has been found at OU 3 in an area that is actively eroded by surface water which may result in the release of asbestos fibers into the Rainy Creek watershed.

34. Samples of the waste vermiculite show concentrations of 3 to 4% Libby amphibole asbestos.

35. The levels of asbestos detected in the waste vermiculite and in surface water at OU 3, if not addressed by implementation of the Work pursuant to this Settlement Agreement, may pose an imminent and substantial threat to receptors at the Site.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

36. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, EPA has determined that:

a. OU3 of the Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at OU3, as identified in the Findings of Fact above, includes a "hazardous substance" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Each Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is jointly and severally liable for performance of response actions and for response costs incurred and to be incurred at OU3. KDC is the "owner" and/or "operator" of the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1). Grace was the "owner" and/or "operator" of the facility at the time of disposal of hazardous substances at the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility as defined by Section 101(22) of CERCLA, 42 U.S.C.§ 9601(22).

f. The removal action required by this Settlement Agreement is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

37. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement Agreement, including, but not limited to, all attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

38. Respondents shall retain one or more contractors to perform the Work and shall notify EPA of the name(s) and qualifications of such contractor(s) within ten (10) days after the Effective Date. Respondents shall also notify EPA of the name(s) and qualification(s) of any other contractor(s) or subcontractor(s) retained to perform the Work at least five (5) days prior to commencement of such Work. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondents. If EPA disapproves of a selected contractor, Respondents shall retain a different contractor and shall notify EPA of that contractor's name and qualifications within five (5) days after EPA's disapproval. Respondents' proposed contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan (QMP). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by EPA.

39. Within ten (10) days after the Effective Date, Respondents shall designate a Project Coordinator who shall be responsible for administration of all actions by Respondents required by this Settlement Agreement and shall submit to EPA the designated Project Coordinator's name, address, telephone number, and qualifications. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. EPA retains the right to disapprove of the designated Project Coordinator. If EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify EPA of that person's name, address, telephone number, and qualifications within 5 days following EPA's disapproval. Receipt by Respondents' Project Coordinator of any notice or communication from EPA relating to this Settlement Agreement shall constitute receipt by all Respondents.

40. EPA has designated Christina Progess as its Project Manager for OU 3 of the Site. Except as otherwise provided in this Settlement Agreement, Respondents shall direct all submissions required by this Settlement Agreement to the EPA Project Manager at U.S. EPA Region 8, EPR-SR, 1595 Wynkoop Street, Denver, 80202.

41. EPA and Respondents shall have the right, subject to Paragraph 39, to change their respective designated Project Manager or Project Coordinator. Respondents shall notify EPA five (5) days before such a change is made. The initial notification may be made orally, but shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

42. Respondents shall perform all actions necessary to implement the Action Memorandum Amendment. Respondents shall conduct the Work in accordance with the provisions of this Settlement Agreement, the Work Plan attached hereto as Appendix B, CERCLA, the NCP, and EPA guidance.

43. Work Plan Implementation.

a. Within twenty-five (25) days after the Effective Date, Respondents shall in accordance with the Work Plan submit to EPA for approval a Sampling and Analysis Plan/ Quality Assurance Project Plan (SAP/QAPP), similar in scope and detail to previous OU 3 SAP/QAPPs, which includes, but is not limited to, the following components: goals of the work to be performed, a list of key personnel and responsibilities, Data Quality Objectives (DQOs), a Field Sampling Plan (FSP), a data management plan, a schedule, and will include all elements of a Quality Assurance Project Plan (QAPP). The FSP portion of the SAP/QAPP will describe the sampling program including the rationale, number, type, and location of samples; the sample collection, handling and custody procedures; the required field documentation and the required analytical methods. The SAP/QAPP will describe the measures necessary to generate data of sufficient quality to achieve the DQOs. The SAP/QAPP will also contain details of any special training requirements and certifications, quality control requirements for field activities and analytical processes, and data validation requirements. The SAP/QAPP must comply with requirements set forth in "EPA Requirements for Quality Assurance Project Plans (QA/R-5)" (EPA/240/B-01/003, March 2001, Reissued May 2006), and "EPA Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/240/R-02/009, December 2002), and the EPA Region 8 QA Document Review Crosswalk (Appendix C).

b. EPA may approve, disapprove, require revisions to, or modify the draft SAP/QAPP in whole or in part. If EPA requires revisions, Respondents shall submit a revised SAP/QAPP within ten (10) days after receipt of EPA's notification of the required revisions.

c. Respondents shall implement the Work Plan and SAP/QAPP as approved in writing by EPA in accordance with the schedule approved by EPA. Once approved, or approved with modifications, the Work Plan, the schedule, and any subsequent modifications shall be incorporated into and become fully enforceable under this Settlement Agreement.

d. Respondents shall not commence any Work except in conformance with the terms of this Settlement Agreement. Respondents shall not commence implementation of the Work Plan until receiving written EPA approval pursuant to Paragraph 43(b).

44. Health and Safety Plan. Within ten (10) days after the Effective Date, Respondents shall submit for EPA review and comment a plan that ensures the protection of the public health and safety during performance of on-site work under this Settlement Agreement. This plan shall be prepared in accordance with EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration (OSHA) regulations found at 29 C.F.R. Part 1910. If EPA determines that it is appropriate, the plan shall also include contingency planning. Respondents shall incorporate all changes to the plan recommended by EPA and shall implement the plan during the pendency of the removal action.

45. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain of custody procedures. Respondents shall either submit samples to EPA for analysis, or ensure that the laboratory used to perform the analyses has met the requirements set forth in Appendix D, and has been accepted by EPA prior to analysis of any OU 3 samples. In brief, approved laboratories must show proficiency in Libby-specific analytical methods, must participate in the EPA QA program at the site (audits, mentoring, lab calls, etc.), and must be able to meet analytical turnaround requirements and electronic data deliverable requirements. Respondents shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondents shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001; Reissued May 2006)," or equivalent documentation as determined by EPA.

b. Upon request by EPA, Respondents shall have an approved laboratory analyze samples submitted by EPA for QA monitoring. Respondents shall provide to EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by EPA, Respondents shall allow EPA or its authorized representatives to take split and/or duplicate samples. Respondents shall notify EPA not less than 10 days in advance of any sample collection activity, unless shorter notice is agreed to by EPA. EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall allow Respondents to take split or duplicate samples of any samples it takes as part of its oversight of Respondents' implementation of the Work.

46. Post-Removal Site Control. In accordance with the Work Plan schedule, or as otherwise directed by EPA, Respondents shall submit a proposal for post-removal site control consistent with Section 300.415(*l*) of the NCP and OSWER Directive No. 9360.2-02. Upon EPA

approval, Respondents shall implement such controls and shall provide EPA with documentation of all post-removal site control arrangements.

47. Reporting.

a. Respondents shall submit a progress report via email to EPA concerning actions undertaken pursuant to this Settlement Agreement weekly after the date of receipt of EPA's approval of the SAP/QAPP until termination of this Settlement Agreement, unless otherwise directed in writing by the EPA Project Manager. These reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondents shall submit three hard (3) copies and one (1) electronic copy of all plans, reports or other submissions required by this Settlement Agreement or any approved work plan, with the exception of weekly progress reports which will be submitted to EPA electronically.

c. Respondents who own or control property at the Site shall, at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to EPA and the State of the proposed conveyance, including the name and address of the transferee. Respondents who own or control property at the Site also agree to require that their successors comply with the immediately preceding sentence and Sections X (Site Access) and XI (Access to Information).

48. Final Report. Within forty-five (45) days after completion of all Work required by this Settlement Agreement, Respondents shall submit for EPA review and approval a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports." The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a discussion of problems encountered and their resolution, a listing of quantities and types of materials removed off-Site or handled on-site, quantities of fill material used to restore the grade in the excavated area if applicable, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits). The final report shall also include a map showing actual dimensions of the excavated areas as well as actual locations of the disposal of the material. This map shall show the locations and sample IDs of confirmation samples taken and location of creek channel and the location of temporary haul roads, if applicable. The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true,

accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

49. Off-Site Shipments.

a. Respondents shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state and to the EPA Project Manager. However, this notification requirement shall not apply to any off-site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

(1) Respondents shall include in the written notification the following information: (i) the name and location of the facility to which the Waste Material is to be shipped; (ii) the type and quantity of the Waste Material to be shipped; (iii) the expected schedule for the shipment of the Waste Material; and (iv) the method of transportation. Respondents shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

(2) The identity of the receiving facility and state will be determined by Respondents following the award of the contract for the removal action. Respondents shall provide the information required by Paragraph 49.a and 49.b as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

b. Before shipping any hazardous substances, pollutants, or contaminants from the Site to an off-Site location, Respondents shall obtain EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents shall only send hazardous substances, pollutants, or contaminants from the Site to an off-Site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

IX. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

50. After review of any plan, report or other item that is required to be submitted for approval pursuant to this Settlement Agreement, in a notice to Respondents, EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that Respondents modify the submission; or (e) any combination of the above. However, EPA shall not modify a submission without first providing Respondents at least one notice of deficiency and an opportunity to cure within thirty ten (10) days, except where doing so would cause serious disruption to the Work, would delay an emergency response, or where previous submission(s) have been disapproved due to material defects.

51. In the event of approval, approval upon conditions, or modification by EPA, pursuant to subparagraph 50 (a), (b), (c) or (e), Respondents shall proceed to take any action

required by the plan, report or other deliverable, as approved or modified by EPA subject only to its right to invoke the dispute resolution procedures set forth in Section XVII (Dispute Resolution) with respect to the modifications or conditions made by EPA. Following EPA approval or modification of a submission or portion thereof, Respondents shall not thereafter alter or amend such submission or portion thereof unless directed by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to subparagraph 50(c) and the submission had a material defect, EPA retains the right to seek stipulated penalties, as provided in Section XIX (Stipulated Penalties).

52. Resubmission.

a. Upon receipt of a notice of disapproval, Respondents shall, within ten (10) days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other deliverable for approval. Any stipulated penalties applicable to the submission, as provided in Section XIX, shall accrue during the ten (10) day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraphs 50 and 51.

b. Notwithstanding the receipt of a notice of disapproval, Respondents shall proceed to take any action required by any non-deficient portion of the submission, unless otherwise directed by EPA. Implementation of any non-deficient portion of a submission shall not relieve Respondents of any liability for stipulated penalties under Section XIX (Stipulated Penalties).

53. If EPA disapproves a resubmitted plan, report or other deliverable, or portion thereof, EPA may again direct Respondents to correct the deficiencies. EPA shall also retain the right to modify or develop the plan, report or other deliverable. Respondents shall implement any such plan, report, or deliverable as corrected, modified or developed by EPA, subject only to Respondents' right to invoke the procedures set forth in Section XVII (Dispute Resolution).

54. If upon resubmission, a plan, report, or other deliverable is disapproved or modified by EPA due to a material defect, Respondents shall be deemed to have failed to submit such plan, report, or other deliverable timely and adequately unless Respondents invoke the dispute resolution procedures in accordance with Section XVII (Dispute Resolution) and EPA's action is revoked or substantially modified pursuant to a dispute resolution decision issued by EPA or superseded by an agreement reached pursuant to that Section. The provisions of Section XVII (Dispute Resolution) and Section XIX (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during dispute resolution. If EPA's disapproval or modification is not otherwise revoked, substantially modified or superseded as a result of a decision or agreement reached pursuant to the dispute resolution process set forth in Section XVII, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XIX.

55. In the event that EPA takes over some of the Work, Respondents shall incorporate and integrate information supplied by EPA into the final report.

56. All plans, reports, and other deliverables submitted to EPA under this Settlement Agreement shall, upon approval or modification by EPA, be incorporated into and enforceable under this Settlement Agreement. In the event EPA approves or modifies a portion of a plan, report, or other deliverable submitted to EPA under this Settlement Agreement, the approved or modified portion shall be incorporated into and enforceable under this Settlement Agreement.

57. Neither failure of EPA to expressly approve or disapprove of Respondents' submission within a specified time period, nor the absence of comments, shall be construed as approval by EPA. Regardless of whether EPA gives express approval for Respondents' deliverables, Respondents are responsible for preparing deliverables acceptable to EPA.

X. SITE ACCESS

58. If the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by any of the Respondents, such Respondents shall, commencing on the Effective Date, provide EPA, the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

59. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondents, Respondents shall use their best efforts to obtain all necessary access agreements within twenty (20) days after the Effective Date, or as otherwise specified in writing by the EPA Project Manager. Respondents shall immediately notify EPA if after using their best efforts they are unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access. Respondents shall describe in writing their efforts to obtain access. EPA may then assist Respondents in gaining access, to the extent necessary to effectuate the response actions described in this Settlement Agreement, using such means as EPA deems appropriate. Respondents shall reimburse EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XVI (Payment of Response Costs).

60. Notwithstanding any provision of this Settlement Agreement, EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

XI. ACCESS TO INFORMATION

61. Respondents shall provide to EPA and the State, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to EPA and the State, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

62. Respondents may assert business confidentiality claims covering part or all of the documents or information submitted to EPA and the State under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA and the State, or if EPA has notified Respondents that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondents.

63. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondents assert such a privilege in lieu of providing documents, they shall provide EPA and the State with the following: (a) the title of the document, record, or information; (b) the date of the document, record, or information; (c) the name and title of the author of the document, record, or information; (d) the name and title of each addressee and recipient; (e) a description of the contents of the document, record, or information; and (f) the privilege asserted by Respondents. However, no documents, reports, or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged or confidential.

64. No claim of privilege or confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XII. RECORD RETENTION

65. Until ten (10) years after Respondents' receipt of EPA's notification pursuant to Section XXX (Notice of Completion of Work), each Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 10 years after Respondents' receipt of EPA's notification pursuant to Section XXX (Notice of Completion of Work), Respondents shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature, or description relating to performance of the Work.

66. At the conclusion of this document retention period, Respondents shall notify EPA and the State at least ninety (90) days prior to the destruction of any such records or documents, and, upon request by EPA or the State, Respondents shall deliver any such records or documents to EPA or the State. Respondents may assert that certain documents, records, and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondents assert such a privilege, they shall provide EPA or the State with the following: (a) the title of the document, record, or information; (b) the date of the document, record, or information;

(c) the name and title of the author of the document, record, or information; (d) the name and title of each addressee and recipient; (e) a description of the subject of the document, record, or information; and (f) the privilege asserted by Respondents. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged or confidential.

67. Each Respondent hereby certifies individually that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed, or otherwise disposed of any records, documents, or other information (other than identical copies) relating to its potential liability regarding the Site since the earlier of notification of potential liability by EPA or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA and State requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927 , and state law.

XIII. COMPLIANCE WITH OTHER LAWS

68. Respondents shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable state and federal laws and regulations, except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws. Respondents shall identify ARARs in the Work Plan subject to EPA approval.

XIV. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

69. In the event of any action or occurrence during performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action. Respondents shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate, or minimize such release or endangerment caused or threatened by the release. Respondents shall also immediately notify the Project Manager and the Environmental Response Specialist (ERS) in Libby (406-291-5335) of the incident or Site conditions. In the event that Respondents fail to take appropriate response action as required by this Paragraph, and EPA takes such action instead, Respondents shall reimburse EPA all costs of the response action not inconsistent with the NCP pursuant to Section XVI (Payment of Response Costs).

70. In addition, in the event of any release of a hazardous substance from the Site, Respondents shall immediately notify the EPA Project Manager and the ERS. Respondents shall submit a written report to EPA within seven (7) days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting

requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

XV. AUTHORITY OF EPA PROJECT MANAGER

71. The EPA Project Manager shall be responsible for overseeing Respondents' implementation of this Settlement Agreement. The EPA Project Manager shall have the authority vested in an On Scene Coordinator by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the EPA Project Manager from the Site shall not be cause for stoppage of work unless specifically directed by the EPA Project Manager.

XVI. PAYMENT OF RESPONSE COSTS

72. Payments for Future Response Costs.

a. Respondents shall pay EPA all Future Response Costs not inconsistent with the NCP. Future Response Costs incurred pursuant to this Settlement Agreement shall be billed pursuant to, and paid with other response costs incurred at OU 3 as allowed by, Section XVIII of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/ Feasibility Study, Docket Number CERCLA-08-2007-0012, dated September 17, 2007 (the "RI/FS AOC") and as discussed in this Paragraph. In the event of a conflict between this Section and Section XVIII of the RI/FS AOC, this Paragraph shall control. On a periodic basis, EPA will send Respondents a bill requiring payment that includes a standard Regionally-prepared cost summary, which includes direct and indirect costs incurred by EPA, its contractors, and DOJ. Respondents shall make all payments within thirty (30) days after receipt of each bill requiring payment, except as otherwise provided in Paragraph 74 of this Settlement Agreement.

b. Respondents shall make all payments required by this Paragraph by a certified or cashier's check or checks or by wire transfer(s) made payable to "EPA Hazardous Substance Superfund" and shall include their name and address and the EPA Site/Spill ID number 08BC(OU3). Respondents shall send the payment(s) as indicated below:

For certified or cashier's checks, payment must be received by 11:00 AM Eastern Time for same day credit and should be forwarded to the following address:

Mail:

U. S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63101

For wire transfers, payment must be sent directly to the Federal Reserve Bank in New York City with the following information:

Federal Reserve Bank of New York
ABA = 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York NY 10045

Field Tag 4200 of the Fedwire message should read: "D 68010727 Environmental Protection Agency"

ACH (also known as REX or remittance express)

U.S. Treasury REX/Cashlink ACH Receiver
ABA- 051036706
Account Number 310006
Environmental Protection Agency
CTX Format Transaction Code 22 – checking
Physical Location:
5700 Rivertech Court
Riverdale, MO 20737

c. At the time of payment, Respondents shall send notice that payment has been made to:

Dana Sherrer
U. S. EPA
26 Martin Luther King Drive
Cincinnati, Ohio 45268

Attention: FINANCE
MS: NWD

E-mail (to both): sherrer.dana@epa.gov and AcctsReceivable.CINWD@epa.gov

and

Cost Recovery Program Manager, ENF-RC
Superfund Enforcement Program
U. S. EPA, Region 8
1595 Wynkoop
Denver, CO 80202-1129

d. The total amount to be paid by Respondents pursuant to Paragraph 72 shall be deposited in the Libby Asbestos Site – OU 3 Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with OU 3 of the Site, or to be transferred by EPA to a sitewide special account or the EPA Hazardous Substance Superfund.

73. If Respondents do not pay Future Response Costs within thirty (30) days of Respondents' receipt of a bill, Respondents shall pay Interest on the unpaid balance of Future Response Costs. The Interest on unpaid Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XIX. Respondents shall make all payments required by this Paragraph in the manner described in Paragraph 72.

74. Respondents may contest payment of any Future Response Costs billed under Paragraph 72 if they determine that EPA has made a mathematical error or included a cost item that is not within the definition of Future Response Costs, or if they believe EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. Such objection shall be made in writing within thirty (30) days after receipt of the bill and must be sent to the EPA Project Manager. Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, Respondents shall within the thirty (30)-day period pay all uncontested Future Response Costs to EPA in the manner described in Paragraph 72. Simultaneously, Respondents shall establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation ("FDIC"), and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Respondents shall send to the EPA Project Manager a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Respondents shall initiate the Dispute Resolution procedures in Section XVII (Dispute Resolution). If EPA prevails in the dispute, within five (5) days after the resolution of the dispute, Respondents shall pay the sums due (with accrued interest) to EPA in the manner described in Paragraph 72. If Respondents prevail concerning any aspect of the contested costs, Respondents shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to EPA in the manner described in Paragraph 72. Respondents shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XVII (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Respondents' obligation to reimburse EPA for its Future Response Costs.

XVII. DISPUTE RESOLUTION

75. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

76. If Respondents object to any EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, they shall notify EPA in writing of their objection(s) within five (5) days after such action, unless the objection(s) has/have been resolved informally. EPA and Respondents shall have twenty (20) days from EPA's receipt of Respondents' written objection(s) to resolve the dispute through formal negotiations (the "Negotiation Period"). The Negotiation Period may be extended at the sole discretion of EPA.

77. Any agreement reached by the Parties pursuant to this Section shall be in writing and shall, upon signature by both parties, be incorporated into and become an enforceable part of this Settlement Agreement. If the Parties are unable to reach an agreement within the Negotiation Period, an EPA management official at the Assistant Regional Administrator level or higher will issue a written decision on the dispute to Respondents. EPA's decision shall be incorporated into and become an enforceable part of this Settlement Agreement. Respondents' obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with EPA's decision, whichever occurs, and regardless of whether Respondents agree with the decision.

XVIII. FORCE MAJEURE

78. Respondents agree to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any event arising from causes beyond the control of Respondents, or of any entity controlled by Respondents, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondents' best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work, or increased cost of performance, or a failure to attain performance standards set forth in the Action Memorandum Amendment.

79. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondents shall notify EPA orally within two (2) days of when Respondents first knew that the event might cause a delay. Within three (3) days thereafter, Respondents shall provide to EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents'

rationale for attributing such delay to a *force majeure* event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall preclude Respondents from asserting any claim of *force majeure* for that event for the period of time of such failure to comply and for any additional delay caused by such failure.

80. If EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, EPA will notify Respondents in writing of its decision. If EPA agrees that the delay is attributable to a *force majeure* event, EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XIX. STIPULATED PENALTIES

81. Respondents shall be liable to EPA for stipulated penalties in the amounts set forth in Paragraphs 82 and 83 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVIII (*Force Majeure*). "Compliance" by Respondents shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of law, this Settlement Agreement, and any plans or other documents approved by EPA pursuant to this Settlement Agreement and within the specified time schedules established by and approved under this Settlement Agreement.

82. Stipulated Penalty Amounts - Work (Including Payments).

a. The following stipulated penalties shall accrue per violation per day for any noncompliance with this Settlement Agreement or failure to pay costs:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 14th day
$2,500	15th through 30th day
$37,500	31st day and beyond

82. Stipulated Penalty Amounts - Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents:

Penalty Per Violation Per Day	Period of Noncompliance
$100	1st through 14th day
$500	15th through 30th day
$5,000	31st day and beyond

84. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 94 (Work Takeover), Respondents shall be liable for a stipulated penalty in the amount of $100,000.

85. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (a) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Respondents of any deficiency; and (b) with respect to a decision by the EPA Management Official designated in Paragraph 77 of Section XVII (Dispute Resolution), during the period, if any, beginning on the 21st day after the Negotiation Period begins until the date that the EPA management official issues a final decision regarding such dispute. Nothing in this Settlement Agreement shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

86. Following EPA's determination that Respondents have failed to comply with a requirement of this Settlement Agreement, EPA may give Respondents written notification of the failure and describe the noncompliance. EPA may send Respondents a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified Respondents of a violation.

87. All penalties accruing under this Section shall be due and payable to EPA within thirty (30) days after Respondents' receipt from EPA of a demand for payment of the penalties, unless Respondents invoke the dispute resolution procedures under Section XVII (Dispute Resolution). Respondents shall make all payments required by this Paragraph to EPA by Fedwire Electronic Funds Transfer ("EFT") to:

Federal Reserve Bank of New York
ABA = 021030004
Account = 68010727
SWIFT address = FRNYUS33
33 Liberty Street
New York NY 10045
Field Tag 4200 of the Fedwire message should read "D 68010727 Environmental Protection Agency"

and shall reference stipulated penalties, Site/Spill ID Number 08-BC(OU3), and the EPA docket number for this action.

At the time of payment, Respondents shall send notice that payment has been made as provided in Paragraph 72.c above.

88. The payment of penalties shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement Agreement.

89. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until fifteen (15) days after the dispute is resolved by agreement or by receipt of EPA's decision.

90. If Respondents fail to pay stipulated penalties when due, EPA may institute proceedings to collect the penalties, as well as Interest. Respondents shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 87. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(*l*) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that EPA shall not seek civil penalties pursuant to Section 106(b) or 122(*l*) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided in this Section, except in the case of a willful violation of this Settlement Agreement or in the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 94 (Work Takeover). Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XX. COVENANT NOT TO SUE BY EPA

91. In consideration of the actions that will be performed and the payments that will be made by Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work and Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondents of all obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Paragraph 72. This covenant not to sue extends only to Respondents and does not extend to any other person.

XXI. RESERVATIONS OF RIGHTS BY EPA

92. Except as specifically provided in this Settlement Agreement, nothing in this Settlement Agreement shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing in this Settlement Agreement shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

93. The covenant not to sue set forth in Section XX above does not pertain to any matters other than those expressly identified therein. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters, including, but not limited to:

a. liability for failure by Respondents to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of Future Response Costs;

c. liability for performance of response actions other than the Work;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and

g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site not paid as Future Response Costs under this Settlement Agreement, except as provided in any other settlement agreement between EPA and Grace that has been entered by the United States Bankruptcy Court for the District of Delaware.

94. Work Takeover. In the event EPA determines that Respondents have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may assume the performance of all or any portion of the Work as EPA determines necessary. Respondents may invoke the procedures set forth in Section XVII (Dispute Resolution) to dispute EPA's determination that takeover of the Work is warranted under this Paragraph. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Respondents shall pay pursuant to Section XVI (Payment of Response Costs). Notwithstanding any other provision of this Settlement Agreement, EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XXII. COVENANT NOT TO SUE BY RESPONDENTS

95. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Montana Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, Section 7002(a) of RCRA, 42 U.S.C. § 6972(a), or state law relating to the Work or Future Response Costs.

96. These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to any of the reservations set forth in Section XXI (Reservations of Rights by EPA), other than in Paragraph 93.a (liability for failure to meet a requirement of the Settlement Agreement) or Paragraph 93.d (criminal liability), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

97. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIII. OTHER CLAIMS

98. By issuance of this Settlement Agreement, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents. The United States or EPA shall not be deemed a party to any contract entered into by Respondents or their directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

99. Nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages, and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

100. No action or decision by EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIV. EFFECT OF SETTLEMENT/CONTRIBUTION

101. Nothing in this Settlement Agreement shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Settlement Agreement. Each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113

of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Settlement Agreement diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

102. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), and that Respondents are entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), or as may be otherwise provided by law, for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work and Future Response Costs. The Parties further agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B), pursuant to which Respondents have, as of the Effective Date, resolved their liability to the United States for the Work and Future Response Costs.

103. Each Respondent shall, with respect to any suit or claim brought by it for matters related to this Settlement Agreement, notify EPA in writing no later than sixty (60) days prior to the initiation of such suit or claim. Each Respondent also shall, with respect to any suit or claim brought against it for matters related to this Settlement Agreement, notify EPA in writing within ten (10) days after service of the complaint or claim upon it. In addition, each Respondent shall notify EPA within ten (10) days after service or receipt of any Motion for Summary Judgment and within ten (10) days after receipt of any order from a court setting a case for trial, for matters related to this Settlement Agreement.

104. In any subsequent administrative or judicial proceeding initiated by EPA, or by the United States on behalf of EPA, for injunctive relief, recovery of response costs, or other relief relating to the Site, Respondents shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, *res judicata*, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant by EPA set forth in Section XX.

105. Effective upon signature of this Settlement Agreement by a Respondent, such Respondent agrees that the time period commencing on the date of its signature and ending on the date EPA receives from such Respondent the payment(s) required by Section XVI (Payment of Response Costs) and, if any, Section XIX (Stipulated Penalties) shall not be included in computing the running of any statute of limitations potentially applicable to any action brought by the United States related to the "matters addressed" as defined in Paragraph 102 and that, in any action brought by the United States related to the "matters addressed," such Respondent will not assert, and may not maintain, any defense or claim based upon principles of statute of limitations, waiver, laches, estoppel, or other defense based on the passage of time during such period. If EPA gives notice to

Respondents that it will not make this Settlement Agreement effective, the statute of limitations shall begin to run again commencing ninety days after the date such notice is sent by EPA.

XXV. INDEMNIFICATION

106. Respondents shall indemnify, save, and hold harmless the United States, its officials, agents, contractors, subcontractors, employees, and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondents agree to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement Agreement. Neither Respondents nor any such contractor shall be considered an agent of the United States.

107. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

108. Respondents waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXVI. INSURANCE

109. At least five (5) days prior to commencing any on-site work under this Settlement Agreement, Respondents shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance and automobile insurance with limits of one million dollars, combined single limit, naming EPA as an additional insured. Within the same time period, Respondents shall provide EPA with certificates of such insurance and a copy of each insurance policy. Respondents shall submit such certificates and copies of policies each year on the anniversary of the Effective Date. In addition, for the duration of the Settlement Agreement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all

persons performing the Work on behalf of Respondents in furtherance of this Settlement Agreement. If Respondents demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondents need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXVII. MODIFICATIONS

110. The EPA Project Manager may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by EPA promptly, but shall have as its effective date the date of the EPA Project Manager's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the Parties.

111. If Respondents seek permission to deviate from any approved work plan or schedule, Respondents' Project Coordinator shall submit a written request to EPA for approval outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from the EPA Project Manager pursuant to Paragraph 110.

112. No informal advice, guidance, suggestion, or comment by the EPA Project Manager other EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVIII. ADDITIONAL REMOVAL ACTION

113. If EPA determines that additional removal actions not included in an approved plan are necessary to protect public health, welfare, or the environment, EPA will notify Respondents of that determination. Unless otherwise stated by EPA, within thirty (30) days after receipt of notice from EPA that additional removal actions are necessary to protect public health, welfare, or the environment, Respondents shall submit for approval by EPA a work plan for the additional removal actions. The plan shall conform to the applicable requirements of Section VIII (Work to Be Performed) of this Settlement Agreement. Upon EPA's approval of the plan pursuant to Section VIII, Respondents shall implement the plan for additional removal actions in accordance with the provisions and schedule contained therein. This Section does not alter or diminish the EPA Project Manager's authority to make oral modifications to any plan or schedule pursuant to Section XXVIII (Modifications).

XXIX. NOTICE OF COMPLETION OF WORK

114. When EPA determines, after EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including post-removal site controls, payment of Future Response Costs, or record retention, EPA will provide written notice to Respondents. If EPA determines that such Work has not been completed in accordance with this Settlement Agreement, EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents modify the Work Plan if appropriate in order to correct such deficiencies. Respondents shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the EPA notice. Failure by Respondents to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXX. INTEGRATION/APPENDICES

115. This Settlement Agreement and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following appendices are attached to and incorporated into this Settlement Agreement:

Appendix A: Action Memorandum Amendment
Appendix B: Work Plan
Appendix C: EPA Region 8 QA Document Review Crosswalk
Appendix D: Asbestos Laboratory Acceptance Criteria for Libby Asbestos Superfund Site

XXXI. EFFECTIVE DATE

116. This Settlement Agreement shall be effective 3 days after the Settlement Agreement is signed by the Regional Administrator or his/her delegate.

The undersigned representatives of Respondents certify that they are fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the parties they represent to this document.

Agreed this 19 day of September, 2012

For Respondent W.R. Grace & Co. – Conn.

By: Karen E. Ethier
Karen E Ethier
Vice President, Global Environment, Health and Safety

For Respondent Kootenai Development Company

By: Karen E. Ethier
Karen E. Ethier
Vice President

It is so ORDERED and Agreed this 19th day of Sept, 2012.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

BY: _____ DATE: 9/19/12
Bill Murray
Director, Superfund Remedial Response Program
Office of Ecosystems Protection and Remediation

BY: _____ DATE: 9/19/12
Kelcey Land
Director, Technical Enforcement Program
Office of Enforcement, Compliance and Environmental Justice

BY: _____ DATE: 9/19/12
Andrea Madigan
Supervisory Attorney, Legal Enforcement Program
Office of Enforcement, Compliance and Environmental Justice

EFFECTIVE DATE: September 24, 2012

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

Ref: EPR-SR

AUG 2 8 2012

ACTION MEMORANDUM AMENDMENT

SUBJECT: Action Memorandum Amendment Requesting Approval to Address Libby Amphibole Asbestos Contamination in Rainy Creek Floodplain for Time-Critical Removal Action in Operable Unit 3 of the Libby Asbestos Superfund Site Libby, Lincoln County, Montana.

FROM: James B. Martin
Regional Administrator

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

Lawrence M. Stanton, Director
Office of Emergency Management

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

Re: Site ID#: BC
Category of Removal: Time Critical, NPL, PRP-Lead Action

I. INTRODUCTION

The purpose of this Action Memorandum Amendment is to request and document approval for increasing the scope of the removal action described in earlier Action Memoranda by adding a time-critical removal action for Rainy Creek within the Libby Asbestos Superfund Site (Site) in Lincoln County, Montana. This Action Memorandum Amendment addresses the removal of Libby amphibole asbestos-containing vermiculite waste in the Rainy Creek floodplain in Operable Unit 3 (OU3).

While considering various alignments for re-routing Rainy Creek as part of a preliminary evaluation of potential site remediation scenarios, Libby amphibole asbestos-containing vermiculite waste was discovered in October 2011 south of and below the "Amphitheater" at OU3. The Amphitheater is a

portion of the Site used for staging soil removed from OU4 (the town of Libby) before it is transported to the top of the former mine for disposal.

The waste is present in an area of approximately five acres below the Amphitheater, north and south of the Rainy Creek channel. The estimated average thickness of the vermiculite waste is about 12 inches based upon information gathered from test pits. A visual estimate of the extent of Libby amphibole asbestos-containing vermiculite waste was made based on color of the material which is easily delineated from native soil by its dark grey to whitish hue, as well as the differences in vegetation density and type growing on the waste material when compared to surrounding soil. Assuming these estimates, the volume of the contaminated vermiculite is about 8,100 cubic yards.

Rainy Creek flows near the vermiculite waste below the Amphitheater, which likely acts as a source of elevated levels of Libby amphibole asbestos that were detected in the surface water in lower Rainy Creek during sampling conducted in 2011. To mitigate the potential for Libby amphibole asbestos in the waste vermiculite to contaminate lower Rainy Creek, the waste material will need to be excavated and transported to the disposal area at the top of the former mine. This is the same area that is used to dispose of Libby amphibole asbestos-contaminated soil removed as part of the remediation of OU4, the town of Libby.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

Libby OU3, Former Vermiculite Mine

The former Zonolite Mine is a portion of OU3 of the Libby Asbestos Superfund Site. The former mine is approximately 6.5 miles east of Libby, Montana. The disturbed area of the mine property is approximately 1,100 acres. Vermiculite was mined beginning in the early 20th century; from 1963 through 1990, the mine, mills and associated processes were operated by the W.R. Grace Company (Grace). The mine was closed by Grace in 1990 due to a decrease in demand for vermiculite. As part of the Superfund designation of the Libby Asbestos Site, a remedial investigation/feasibility study (RI/FS) was initiated at OU3 in October 2007.

Aside from being the single largest known deposit of vermiculite in the world, the Zonolite deposit is unique in that it contains an assemblage of amphibole asbestos minerals including the form known as Libby amphibole asbestos. In the Zonolite deposit, asbestos was introduced to the vermiculite by hydrothermal waters, millions of years after the emplacement of the vermiculite.

The mined deposit is in the form of a dome, in the center of a roughly circular basin. The rim is from 400 to 900 feet above the top of the mine. The basin is drained by Fleetwood Creek around the north flank of the vermiculite dome and by Carney Creek around the south flank. These creeks are tributaries to Rainy Creek, a much larger stream whose headwaters are at an elevation of 5,500 feet on the slope of Blue Mountain, about five miles north-northwest of the mine. Rainy Creek and Fleetwood Creek flow into the mine tailings impoundment. High water flows during spring snowmelt that cannot be contained

by the impoundment dam flow through a box culvert and a spillway, re-joining the Rainy Creek channel below the dam. Carney Creek joins Rainy Creek downstream of the impoundment. From the area of the mine, Rainy Creek flows southwest about two miles to the Kootenai River, a major tributary to the Columbia River system.

B. Other Actions to Date

The initial Action Memorandum (EPA Region 8, May 23, 2000) and subsequent Amendments (August 2001, May 2002, May 2006, June 2006, September 2008, June 2009, August 2009, and April 2012) provide basic descriptions of the vermiculite mine, vermiculite processing facilities, several contaminated properties, and the conditions found throughout the Libby valley. The September 2008 Amendment describes actions at other creeks within the Libby Site, but does not address Rainy Creek in OU3. In 2011, surface water samples were collected to characterize Libby amphibole asbestos concentrations in the Rainy Creek watershed (SRC & CDM 2011).

C. Current Actions

The responsible parties, W.R. Grace & Co. – Conn and Kootenai Development Company, are performing a remedial investigation (RI) in OU3 pursuant to EPA oversight.

D. State, Local, and Other Authorities' Roles

There are no significant changes in roles from the previous April 2012 Action Memorandum Amendment. The Montana Department of Environmental Quality (MDEQ) has taken the lead role for the investigation and screening of the town of Troy (OU7). The United States Army Corps of Engineers is supporting the EPA in providing contracting and construction oversight for the removal and remedial actions. The Agency for Toxic Substances and Disease Registry (ATSDR), the United States Geological Survey (USGS), and the National Institute for Occupational Safety and Health are active participants in the Libby Action Plan, which is a suite of scientific studies aimed at expanding our knowledge of the toxicity of Libby amphibole asbestos. The USGS also provides EPA with technical assistance regarding the mineralogy, morphology, and measurement of Libby amphibole asbestos. Lincoln County and the City of Libby are active in several local advisory groups and coordinate directly with EPA on many issues regarding the removal actions and remedial investigations. In addition to its lead role for Troy, the MDEQ coordinates with EPA on the implementation of all removal actions and remedial investigations.

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

A. Threats to Public Health or Welfare:

Despite considerable progress, conditions at OU3 of the Libby Asbestos Site still present a significant threat to public health. EPA has considered all of the factors described in Section 300.415(b)(2) of the NCP, and has determined the following factors continue to be present at the Libby Asbestos Site, in particular at OU3:

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

A discussion of the type and nature of risks posed throughout the Libby Asbestos Site has been provided in the previous Action Memoranda.

Exposures to Libby amphibole asbestos fibers from the Libby mine site are hazardous to humans as evidenced by the occurrence of asbestos-related disease in area residents and workers. Workers and area residents exposed to elevated levels of asbestos fibers from the Libby mine site have been found to have increased mortality and morbidity from asbestos-related conditions, including asbestosis, pleural fibrosis, lung cancer, and mesothelioma. Asbestos-related lung diseases have also been observed in area residents with no direct occupational exposures, including family members of mine workers, and even in those with no known association with the vermiculite mining or processing activities (Weis, 2001; Miller, 2005; ATSDR, 2002; ATSDR, 2003).

Adverse health effects from exposures to asbestos are not limited to the respiratory system. Oral exposures to asbestos fibers greater than 10 μm in length have resulted in tumor formation in the gastrointestinal tract in rats (EPA, 1985). These data were the basis for the development of EPA's Maximum Contaminant Level (MCL) for asbestos in drinking water of 7 million fibers per liter.

Surface water sampling results of the Rainy Creek watershed show that Libby amphibole asbestos contamination from the former vermiculite mine is reaching Rainy Creek and its tributaries. Results from surface water sampling in the Rainy Creek watershed show that the concentration of asbestos exceeds the applicable MDEQ and EPA water quality benchmarks. As a water quality benchmark, the State of Montana has adopted EPA's MCL for asbestos of 7 million fibers per liter (MDEQ 2010). Thus, due to the presence of Libby amphibole asbestos in Rainy Creek, there is a threat to public health due to the exceedance of the MCL and the degradation of a potential drinking water source.

In addition, Libby amphibole asbestos-containing water from Rainy Creek used for irrigation or associated with flooding events could recontaminate other operable units such as OU2 (the former screening plant) and could affect the protectiveness of the remedy for these OUs. Water containing Libby amphibole asbestos used for irrigation or deposited on land during flooding events will evaporate leaving behind Libby amphibole asbestos fibers that will be available for inhalation exposures and potential respiratory adverse health effects such as asbestosis, pleural fibrosis, lung cancer, and mesothelioma.

(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate

While covered by vegetation, the waste vermiculite, which contains 3 – 4 % Libby amphibole asbestos, is located in the floodplain of Rainy Creek. The channel of Rainy Creek flows adjacent to the waste vermiculite, which is likely contributing some of the Libby amphibole asbestos that is observed in downstream samples of Rainy Creek water. Libby amphibole asbestos-containing water used for

irrigation or associated with flooding events could recontaminate soils at other operable units such as OU2 (the former screening plant) and could affect the protectiveness of the remedy for these OUs. Water containing Libby amphibole asbestos is used for irrigation or deposited on land during flooding events, which will evaporate leaving behind Libby amphibole asbestos fibers that will be available for inhalation exposures and potential respiratory adverse health effects such as asbestosis, pleural fibrosis, lung cancer, and mesothelioma.

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to be released

High water or flooding events, such as those associated with spring thaws, can cause Rainy Creek to erode Libby amphibole asbestos-containing surface soil releasing Libby amphibole asbestos into Rainy Creek. Libby amphibole asbestos found in surface water in OU3 can migrate to other water bodies such as the Kootenai River. This migration of Libby amphibole asbestos fibers from OU3 can contaminate not only the Kootenai River (and other water bodies down gradient from the Kootenai), but also impacted land areas surrounding these water bodies via irrigation activities or during flooding events as described above.

B. Threats to the Environment

Work on an ecological risk assessment was initiated in September 2007. Investigations to assess ecological impacts from Libby amphibole asbestos-containing media are currently underway. While currently no response actions are based on ecological impacts at the Site, this may change as data are collected and analyzed.

IV. ENDANGERMENT DETERMINATION

The actual or threatened releases from this Site, if not addressed by continuing to implement the time-critical removal actions set forth in the original Action Memorandum, subsequent Amendments, and this Amendment may present an imminent and substantial endangerment to public health or welfare or the environment. The original Action Memorandum for the Site, dated May 23, 2000 (EPA Region 8, 2000), as well as subsequent Amendments and the administrative record, describe in detail evidence of the toxicity associated with exposure to Libby amphibole asbestos, the large number of human exposure pathways, the significantly elevated disease rate in Libby residents, and the variety of conditions present in and around Libby that could lead to continuing exposures. The rationale for determination of an imminent and substantial endangerment from exposures in Libby is four-fold: 1) amphibole fibers from Libby amphibole asbestos have been demonstrated to cause a variety of lethal and sublethal health effects in exposed members of the Libby community; 2) complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement; 3) Libby amphibole asbestos fibers have been positively identified in multiple media (air, soil, dust, and water); and 4) risk estimation by a variety of qualitative and quantitative techniques indicates unacceptable human exposure. This Action Memorandum Amendment specifically addresses the mitigation of Libby amphibole asbestos contamination into Rainy Creek, a potential drinking water source.

V. EXEMPTION FROM STATUTORY LIMITS

The Libby Action Memorandum dated May 23, 2000, provided the documentation required to meet the NCP Section 300.415(b) criteria for a removal action. The May 2002 Action Memorandum Amendment provided EPA's determination concerning the consistency exemption at CERCLA Section 104(c)(1) [NCP Section 300.415(b)(5)(ii)]. These provisions continue to apply to the Rainy Creek Floodplain removal action. Since this Action Memorandum Amendment is being prepared separately from the other Libby Site Action Memorandum Amendments, it only shows costs for the Rainy Creek Floodplain removal action, not for the rest of the Site.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Action Description

The Action Memorandum Amendment from May 2002 sets forth the basic scope for the current set of removal actions at the Libby Asbestos Site. The current set of Action Memorandum Amendments, including the 2008 Creeks Action Memorandum Amendment (EPA Region 8, 2008), acknowledges that more portions of the Libby Asbestos Site require cleanup than originally anticipated. This Action Memorandum Amendment addresses the Rainy Creek Floodplain in OU3.

Vermiculite waste containing Libby amphibole asbestos will be removed from the Rainy Creek floodplain. This area is directly south of the Amphitheater and downstream from the confluence of Rainy Creek and Carney Creek. Excavated contaminated vermiculite will be placed in dump trucks and covered during transport to the disposal area. During excavation and loading, the excavator, dump trucks and material to be excavated and removed will be continuously sprayed with water to suppress dust and prevent potential release of Libby amphibole asbestos fibers into the atmosphere. Filled dump trucks will travel about three miles up the main mine haul road and will place the waste material in designated areas or constructed cells, as has been done with waste from OU4. Based on the estimated volume of contaminated materials, more than 900 truckloads will be transported to the top of the former mine. In addition to using the visible contrast between the waste material and the native soil to determine the depth and area of waste removal, confirmation samples will be collected and analyzed.

B. Contribution to remedial performance

The Site was made final on the NPL in October 2002. While cleanup at the Site continues to be conducted using removal authority, the Site was transitioned to the Region 8 Remedial Program after final listing on the NPL. It is expected that the cleanup approaches used during removal actions will be similar to, and consistent with, those used during remedial actions.

C. Description of alternative technologies

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

D. EE/CA

No EE/CA is required.

E. Applicable or relevant and appropriate requirements

A list of federal and state ARARs pertinent to this removal is attached (see Appendix A). ARARs to be attained by the action will be finalized in the approved final work plan.

F. Project Schedule

Work on Rainy Creek is expected to begin during the summer of 2012, and is to be completed in the fall of 2012.

G. Estimated Costs

The estimated extramural cost to conduct the Removal Action for the Rainy Creek Floodplain is $155,360.

Labor	$51,730
Equipment	$70,200
Other Field Cost	$12,430
Cost of OU3 Removal	***$134,360***
Third-party quality assurance and oversight	$21,000
TOTAL COST	**$155,360**

This Action Memorandum amendment does not seek any increase in site ceiling. The total estimated cost for removal actions in 2012 and 2013 is $50,000.000.

H. Administrative Record

The administrative record for this Action Memorandum Amendment will be available at the EPA Superfund Records Center, 1595 Wynkoop Street, Denver, CO 80202, (303) 312-6473, within 60 days of the effective date of the Action Memorandum Amendment. A copy of the administrative record will also be available at the EPA Information Center, 108 E. 9th Street, Libby, MT, (406) 293-6194.

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

Delayed action will result in the ongoing potential for continued public exposure to high levels of Libby amphibole asbestos. Failure to take action has the potential to increase the risk to public health and continue to burden an already impacted community.

VIII. OUTSTANDING POLICY ISSUES

There are no new policy issues or considerations.

IX. ENFORCEMENT

A confidential enforcement addendum has been prepared.

X. RECOMMENDATION

This decision document represents the selected removal action for the removal of Libby amphibole asbestos sources from the Rainy Creek Floodplain in OU3 of the Libby Asbestos Site in Lincoln County, Montana. The proposed removal action has been developed in accordance with CERCLA as amended and is consistent with the NCP. The decision is based on the Administrative Record for OU3 of the Site. Conditions at the Site continue to meet the NCP [40 CFR § 300.415(b)] criteria for a removal action.

Approve: _____ Date: 8/31/2012
Mathy V. Stanislaus, (In travel)
Assistant Administrator
Office of Solid Waste and Emergency Response

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

REFERENCES

ATSDR, 2002. Mortality in Libby, Montana 1979-1998, Libby Asbestos Site, Libby, Lincoln County, Montana, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR, 2003. Report on the Expert Panel on Health Effects of Asbestosis and Synthetic Vitreous Fibers: The Influence of Fiber Length, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

EPA, 1985. Drinking Water Criteria Document for Asbestos, EPA 600/X-84-199-1, Office of Research and Development, Cincinnati, OH.

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

EPA Region 8, 2001. Action Memorandum Amendment, Libby Asbestos Site, August 17, 2001.

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

EPA Region 8, 2006. Action Memorandum Amendment, Libby Asbestos Site, May 15, 2006.

EPA Region 8, 2006. Action Memorandum Amendment, Libby Asbestos Site, June 27, 2006.

EPA Region 8, 2008. Action Memorandum Amendment, Libby Asbestos Site, September 24, 2008.

EPA Region 8, 2009. Action Memorandum Amendment, Libby Asbestos Site, June 17, 2009.

EPA Region 8, 2009. Action Memorandum Amendment, Libby Asbestos Site, August 13, 2009.

EPA Region 8, 2012. Action Memorandum Amendment, Libby Asbestos Site, April 10, 2012.

MDEQ, 2010. Circular DEQ-7, Montana Numeric Water Quality Standards, August 2010.

Miller, 2005. Amphibole Mineral Fiber Contamination of Various Source Materials in Residential and Commercial Areas of Libby Pose an Imminent and Substantial Endangerment to Public Health. Memorandum from Aubrey Miller, USEPA Regional Medical Officer and Site. Dated 9/29/2005.

SRC & CDM, 2011. Phase IV Sampling and Analysis Plan, Remedial Investigation, Part B: Surface Water Study, Libby Asbestos Site, Operable Unit 3, April 4, 2011.

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

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)
OU3 Rainy Creek Floodplain Removal Action - Libby Asbestos NPL Site

I. INTRODUCTION

40 CFR 300.415(j) provides that removal actions under CERCLA attain, to the extent practicable considering the exigencies of the situation, all state and federal applicable or relevant and appropriate requirements (ARARs). In considering whether compliance with ARARs is practicable, EPA will consider the urgency of the situation and the scope of the removal action being conducted.[1]

This document identifies potential ARARs for the OU3 Rainy Creek Floodplain removal action to be conducted at the Libby Asbestos National Priorities List Site. The following ARARs or groups of related ARARs are each identified by a statutory or regulatory citation, followed by a brief explanation of the ARAR and how and to what extent the ARAR is expected to apply to the activities to be conducted under this removal action. The final work plan for the OU3 Rainy Creek Floodplain removal action will identify ARARs specific to this removal action.

Substantive provisions of the requirements listed below are identified as ARARs pursuant to 40 CFR § 300.400. ARARs must be attained during and at the completion of the removal action.[2] No Federal, State or local permit shall be required for the portion of any removal action conducted entirely on site in accordance with Section 121(e) of CERCLA, 42 U.S.C. § 9621(e).

II. TYPES OF ARARs

ARARs are either "applicable" or "relevant and appropriate." Both types of requirements are mandatory under the NCP.[3] Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental and facility siting laws that specifically address a hazardous substance, pollutant, contaminant, removal action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.[4]

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, locations, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to

---

1 40 CFR § 300.415(i)(1) and (2).

2 Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan, 55 Federal Register (FR) 8695 (March 8, 1990).

3 CERCLA § 121(d)(2)(A), 42 U.S.C. § 6921(d)(2)(A). See also, 40 CFR § 300.430(f)(1)(i)(A). Note that that these references apply to remedial actions.

4 40 CFR § 300.5.

those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.[5]

The determination that a requirement is relevant and appropriate is a two-step process: (1) determination if a requirement is relevant and (2) determination if a requirement is appropriate. In general, this involves a comparison of a number of site-specific factors, including an examination of the purpose of the requirement and the purpose of the proposed CERCLA action; the medium and substances regulated by the requirement and the proposed action; the actions or activities regulated by the requirement and the removal action; and the potential use of resources addressed in the requirement and the removal action. When the analysis results in a determination that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable.[6]

ARARs are contaminant, location, or action specific. Contaminant specific requirements address chemical or physical characteristics of compounds or substances on sites. These values establish acceptable amounts or concentrations of chemicals which may be found in or discharged to the ambient environment.

Location specific requirements are restrictions placed upon the concentrations of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs relate to the geographical or physical positions of sites, rather than to the nature of contaminants at sites. Action specific requirements are usually technology based or activity based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants. A given cleanup activity will trigger an action specific requirement. Such requirements do not themselves determine the cleanup alternative, but define how chosen cleanup methods should be performed.

Many requirements listed as ARARs are promulgated as identical or near identical requirements in both federal and state law, usually pursuant to delegated environmental programs administered by EPA and the state. The Preamble to the NCP provides that such a situation results in citation to the state provision and treatment of the provision as a federal requirement.

Also contained in this list are policies, guidance or other sources of information which are Ato be considered@ in the implementation of the removal action. Although not enforceable requirements, these documents are important sources of information which EPA and the State of Montana Department of Environmental Quality (MDEQ) may consider, especially in regard to the evaluation of public health and environmental risks; or which will be referred to, as appropriate, in developing cleanup actions.[7] These final ARARs will be set forth as performance standards for any and all removal work plans.

---

5 40 CFR §300.5.

6 CERCLA Compliance with Other Laws Manual, Vol. I, OSWER Directive 9234.1-01, August 8, 1988, p. 1-11.

7 40 CFR § 300.400(g)(3); Preamble to the NCP, 55 Fed. Reg. 8744-8746 (March 8, 1990).

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
Federal ARARs						
E.O. 11988 Protection of Floodplains 40 CFR 6.302 and Appendix A	Applicable	Regulates construction in floodplains.	Action is within Rainy Creek floodplain.		✓	
E.O. 11990 Protection of Wetlands 40 CFR 6.302(a) and Appendix A	Applicable	Minimizes adverse impacts on areas designated as wetlands.	Wetlands may be present in area of the removal action.		✓	
Clean Water Act Section 404 33 USC 1251, et seq 40 CFR 230, 231	Applicable	Requires Federal agencies to avoid, to the extent possible, adverse impacts associated with destruction or loss of wetlands. Regulates the discharge of dredged or fill material into waters of U.S.	Regulations are applicable only if removal activities impact wetland areas. Dredge and fill substantive requirements will apply if dredge or fill material is discharged to waters of the U.S.		✓	✓
National Historic Preservation Act, 16 U.S.C. § 470, 40 CFR 6.301(b) 36 CFR 60, 63, 800	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places.	It is not anticipated that any cultural or archeological resources will be found. If any are found, consultation with the State Historic Preservation Office and compliance with the National Historic Preservation Act will be addressed during removal planning.		✓	
Archaeological and Historic Preservation Act, 16 U.S.C. § 469, 40 CFR 6.301(c), 43 CFR 7	Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	Expected to be out of scope of the removal action.		✓	
Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661, et seq., 40 CFR 6.302(g), 33 CFR 320-330	Applicable	Requires coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	If the removal action will involve activities that impact wildlife and/or non-game fish, consultation is required with the U.S. Fish and Wildlife Service and the relevant state agency with jurisdiction over wildlife resources.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
Federal ARARs						
Endangered Species Act, 16 U.S.C. § 1531, 40 CFR 6.302, 50 CFR 17 and 402	Applicable	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. Endangered Species Act, Section 7 requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the removal areas, activities must be designed to conserve the species and their habitat.		✓	
Migratory Bird Treaty Act, 16 U.S.C. §§ 703, et seq., 50 CFR 10.13	Applicable	This requirement establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the U.S. Fish and Wildlife Service during removal design and removal construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	The removal action will be carried out in a manner to avoid adversely affecting migratory bird species, including the bald eagle and including individual birds or their nests.		✓	
CAA, 42 U.S.C. §§ 7401, et seq., 40 CFR 61.150 Note: Section 61.150(a)(4) not delegated to the State per 40 CFR 61.157	Relevant and Appropriate	Standard for waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations. Provides detailed procedures for processing, handling and transporting ACM waste generated during building demolition and renovation (among other sources). The provision allows an alternative emission control and treatment method.	Relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
CAA, 40 CFR 61.154 Note: Section 61.154(d) not delegated to the State per 40 CFR 61.157	Relevant and Appropriate	Standard for active waste disposal sites. Provides requirements for off-site disposal sites receiving ACM waste from demolitions and other specific sources. The provision allows an alternative emission control.	It is not expected that there will be offsite shipment of ACM waste as part of this removal action.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Montana Asbestos Control Act (MACA), MCA 75-2-501 et seq., and implementing regulations at ARM 17.74.301 through 17.74.368	Applicable/ Relevant and Appropriate/ Other Requirements	The MACA and implementing rules establish standards and procedures for asbestos abatement practices and for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.	Only the portions of the MACA and implementing regulations governing the handling of asbestos containing waste materials are applicable. The removal of vermiculite containing Libby amphibole from the Rainy Creek floodplain meets the statutory definition of an asbestos project. All other provisions (e.g., those governing accreditation, training, etc.) do not meet the requirements of ARARs. The substantive requirements for performance of removal actions and for disposal of asbestos containing materials must be met. These requirements will be addressed as part of the Health and Safety Plan. On-site CERCLA actions do not require a permit.			✓
MACA, MCA 75-2-501 et seq., ARM 17.74.357	Applicable	Establishes air monitoring and visual inspection requirements for asbestos projects, including standards and methods for clearing asbestos projects.	17.74.357(2) and (6) Require visual inspection and air sampling upon completion of an asbestos project. The concentration of asbestos fibers in air clearance samples must be: (a) less than or equal to 0.01 fibers per cubic centimeter of air for each of five samples collected within the work area, if analyzed by PCM. The PCM analysis must be conducted using the NIOSH 7400 or NIOSH 7402 method; or (b) less than or equal to the average concentration of 70 structures per square millimeter for five samples collected within the work area, if analyzed by transmission electron microscopy (TEM). The TEM analysis must be conducted using EPA's interim TEM analytical methods provided in 40 CFR 763, subpart E, appendix A. These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.			✓
Strip and Underground Mine Reclamation Act, MCA 82-4-371, MCA; ARM 17.24.500-.761	Relevant and Appropriate	Establishes requirements for mine reclamation.	These requirements address soil cover; erosion control; runoff control; establishing appropriate native vegetative cover; soil amendment; fish and wildlife habitat support; and dust control.			✓
Strip and Underground Mine Reclamation Act,	Relevant and Appropriate	All surface drainage from the disturbed area must be addressed with the best technology currently	Sediment control through BTCA must be maintained until the disturbed area is reclaimed			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
ARM 17.24.633		available (BTCA) as that term is defined in ARM 17.24.301(19).	and revegetation requirements are met.			
Clean Air Act of Montana, MCA 75-2-101, et seq., ARM 17.8.220, ARM 17.8.223	Applicable	Prohibits causing or contributing to concentrations of particulate matter (PM) in ambient air that exceed a 30-day average of 10 grams per square meter or PM-10 concentrations in the ambient air that exceed 150 micrograms/m3 of air on a 24-hour average and 50 micrograms/m3 of air on an annual average.	The removal action may involve significant disturbance of soil. Particulate/dust levels will need to be controlled. Dust control measures will ensure that the PM MAAQS are met.			✓
Clean Air Act of Montana, MCA 75-2-101, et seq., ARM 17.8.308	Applicable	No person shall cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter. No person shall operate a construction site or demolition project unless reasonable precautions are taken to control emissions of airborne particulate matter.	This standard applies to use of streets, roads, or parking lots; and to construction projects. Dust control measures will ensure that air standards for airborne particulate matter will not be exceeded during the removal action.			✓
ARM 17.8.220 and ARM17.24.761 (Strip and Underground Mine Reclamation Act)	Relevant and Appropriate	Specifies measures for controlling fugitive dust during mining and reclamation activities. Such measures include paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regarded lands.	Fugitive dust control measures must be met.			✓
Montana Water Quality Act (MWQA), MCA 75-5-101, et seq., and implementing regulations at ARM 17.30.101	Applicable	General. The Clean Water Act, 33 U.S.C. §1251, et seq., provides the authority for each state to adopt water quality standards (40 CFR Part 131) designed to protect beneficial uses of each water body and requires each state to designate uses for each water body. The MWQA, 75-5-101, et seq., MCA establishes requirements for restoring and maintaining quality of surface and ground water. ARM 17.30.601, et seq., and establishes the Water-Use Classification system. Under ARM 17.30.609, the water-use for the Kootenai River is AB-1. Under	This requirement is triggered in the event the removal action causes discharges to, or impacts, state waters.	✓		

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
		ARM 17.30.623(1), B-1 waters are to be maintained suitable for drinking, culinary, and food processing use after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, furbearers; and agricultural and industrial water supply. Ditches and certain other bodies of surface water must also meet these requirements.[8]				

[8] As provided under ARM ' 17.30.602(33), A'surface waters' means any waters on the earth's surface, including but not limited to, streams, lakes, ponds, and reservoirs; and irrigation and drainage systems discharging directly into a stream, lake, pond, reservoir or other surface water. Water bodies used solely for treating, transporting or impounding pollutants shall not be considered surface water.

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.609	Applicable	Water Use Classifications for the Kootenai River Drainage, all waters except those specifically listed in ARM 17.30.609(1)(a) are classified as B-1; Rainy Creek drainage to the W.R. Grace Company water supply intake (near the mill pond) is A-1; Rainy Creek main stem from the W.R. Grace Company water supply intake to the Kootenai River is C-1; Kootenai River, Carney Creek and Fleetwood Creek are all classified B-1.	This requirement is triggered in the event the removal action causes discharges to, or impacts, state waters.	✓		
		Waters classified A-1 are, to be maintained suitable for drinking, and culinary and food processing purposes after conventional treatment for removal of				
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.622	Applicable	natural impurities. These waters must also be maintained suitable for bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and for agricultural and industrial water supply purposes. The rule sets forth water quality standards for E. coli, dissolved oxygen, pH, turbidity, temperature, sediment, solids, color, concentrations of carcinogenic, bioconcentrating, toxic, radioactive, nutrient, or harmful parameters may not exceed standards set forth in MDEQ circular DEQ-7. The numerical standard for asbestos in DEQ-7 is based on the MCL for drinking water regulations of 7,000,000 fibers longer than 10 microns/liter. The concentration may not exceed this limit in any sample.	Rainy Creek drainage to the W.R. Grace Company water supply intake (near the mill pond) is A-1. This requirement is triggered in the event the removal action causes discharges to, or impacts, state waters.	✓		

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.623	Applicable	Under ARM 17.30.623(1), waters classified B-1 are suitable for drinking, culinary and food processing purposes. These waters are also to be maintained suitable for bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and use for agricultural and industrial purposes. The rule sets forth water quality standards for E. coli, dissolved oxygen must not be reduced below standards set forth in DEQ-7; pH, turbidity, temperature, sediment, solids, color, concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters may not exceed standards set forth in MDEQ circular DEQ-7. The numerical standard for asbestos, is based on the MCL for drinking water regulations of 7,000,000 fibers longer than 10 microns/liter. The concentration may not exceed this limit in any sample.	Kootenai River, Carney Creek and Fleetwood Creek are all classified B-1. This requirement is triggered in the event the removal action causes discharges to, or impacts, state waters.	✓		
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.626	Applicable	Waters classified C-1 are to be maintained suitable for bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and use for agricultural and industrial purposes. The rule sets forth water quality standards for E. coli, dissolved oxygen must not be reduced below standards set forth in DEQ-7; pH, turbidity, temperature, sediment, solids, color, concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters may not exceed standards set forth in MDEQ circular DEQ-7. The numeric standard for asbestos is based on the MCL for drinking water regulations of 7,000,000 fibers longer than 10 microns/liter. The concentration may not exceed this limit in any sample.	Rainy Creek main stem from the W.R. Grace Company water supply intake to the Kootenai River is classified C-1. This requirement is triggered in the event the removal action causes discharges to, or impacts, state waters.	✓		

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.637	Applicable	General Prohibitions No waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards. Surface waters must be free of substances attributable to industrial practices or other discharges that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; or (e) create conditions which produce undesirable aquatic life. Leaching pads, tailings ponds, or water or waste or product holding facilities must be located, constructed, operated and maintained in such a manner and of such materials to prevent any discharge, seepage, drainage, infiltration, or flow which may result in pollution of state waters, and a monitoring system may be required to ensure such compliance.	The removal action must not adversely impact surface water. Excavation will take place within the Rainy Creek floodplain. Accidental release of asbestos-containing soils into surface water must be prevented.			✓
Montana Water Quality Act, MCA 75-5-605	Applicable	It is unlawful to cause pollution of any state waters, or to place or cause to be placed any wastes where it will cause pollution of state waters.	Accidental release of asbestos-containing soils into surface water must be prevented.			✓
Montana Water Quality Act, MCA 75-5-101, et seq., ARM 17.30.701 – 17.30.718	Applicable	Nondegradation of water quality – existing and anticipated uses of surface water and water quality necessary to support those uses must be maintained and protected.	Existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected. Section 75-5-317, MCA, provides an exemption from nondegradation requirements which allows changes of existing water quality resulting from an emergency action or reclamation that is designed to protect the public health or the environment and that is approved, authorized, or required by the department. Degradation meeting these requirements may be considered nonsignificant.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
ARM 17.30.601, et seq., and ARM 17.30.1301, et seq., including ARM 17.30.1341	Applicable	DEQ has issued general storm water permits for certain activities. The substantive requirements of the General Permit for Storm Water Discharge Associated with Construction Activity, Permit No. MTR100000 (April 16, 2007) will apply to removal actions at OU-3.	The general permit requires best management practices to prevent discharges which have a reasonable likelihood of adversely affecting human health or the environment.			✓
Montana Natural Streambed and Land Preservation Act of 1975, MCA 75-7-101, et seq. ARM 36.2.401, et seq.	Applicable/ Relevant and Appropriate	Establishes minimum standards if a project alters or affects a streambed, including any channel change, new diversion, riprap or other stream-bank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development.	The remedial action may require stream-bank protection. All disturbed areas must be managed during construction and reclaimed after construction to minimize erosion. Temporary structures used during construction must be designed to handle high flows reasonably anticipated during the construction period. Temporary structures must be completely removed from the stream channel at the conclusion of construction, and the area must be restored to a natural or stable condition. Channel alterations must be designed to retain original stream length or otherwise provide hydrologic stability. Streambank vegetation must be protected, except where removal of such vegetation is necessary for the completion of the project. When removal of vegetation is necessary, it must be kept to a minimum. Riprap, rock, and substantive provisions of MCA 87-5-502 and 87-5-504other material used in a project must be of adequate size, shape, and density and must be properly placed to protect the streambank from erosion. The placement of road fill material in a stream, the placement of debris or other materials in a stream where it can erode or float into the stream, projects that permanently prevent fish migration, operation of construction equipment in a stream, and excavation of streambed gravels are prohibited, unless specifically authorized. Response actions must also protect the use of water for any useful or beneficial purpose. *See* Section 75-7-102, MCA.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Substantive provisions of MCA 87-5-502 and 87-5-504	Relevant and Appropriate	Provides that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat.	While the administrative / procedural requirements, including the consent and approval requirements set forth in these statutes and regulations are not ARARs, consultation with the Montana Department of Fish, Wildlife and Parks, and any conservation district or board of county commissioners (or consolidated city/county government) is encouraged during the design and implementation of the removal action at OU3, to assist in the evaluation of impacts of the project on fish and wildlife habitat.		✓	
Montana Floodplain and Floodway Management Act, MCA 76-5-401 et seq., and implementing regulations, ARM 36.15.601 et seq.	Applicable/ Relevant and Appropriate	The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway[9] and floodplain.[10]	These standards are applicable to all actions within the Rainy Creek, Carney Creek and Fleetwood Creek floodplain. These regulations specify factors that must be considered in allowing diversions of the stream, changes in place of diversion of the stream, flood control works, new construction or alteration of artificial obstructions, or any other nonconforming use within the floodplain or floodway. Many of these requirements are set forth as factors that must be considered in determining whether a permit can be issued for certain obstructions or uses. While permit requirements are not directly applicable to remedial actions conducted entirely on site, the substantive criteria used to determine whether a proposed obstruction or use is permissible within the floodway or floodplain are applicable standards.		✓	
Montana Floodplain and Floodway Management	Relevant and Appropriate	These regulations list prohibited uses within the floodway including: a structure or excavation that will cause water to be diverted from the established	These standards are applicable to all actions within the Rainy Creek, Carney Creek and Fleetwood Creek floodplain.		✓	

9 The "floodway" is the channel of a watercourse or drainway and those portions of the floodplain adjoining the channel that are reasonably required to carry and discharge the floodwater of the watercourse or drainway. ARM 36.15.101(13).

10 The "floodplain" is the area adjoining the watercourse or drainway that would be covered by the floodwater of a base (100-year) flood except for sheetflood areas that receive less than one foot of water per occurrence. The floodplain consists of the floodway and flood fringe. ARM 36.15.101(11).

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chem-ical	Loca-tion	Action
State of Montana ARARs						
Act, MCA 76-5-403, ARM 36.15.605		floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway; solid and hazardous waste disposal; and storage of hazardous, toxic, flammable, or explosive materials.				
Montana Endangered Species Act MCA 87-5-106, 107, and 111 ARM 12.5.201	Applicable	Endangered species must be protected in order to maintain and, to the greatest extent possible, enhance their numbers. These sections list endangered species, prohibited acts, and penalties. See also MCA 87-5-201 (applicable), concerning protection of wild birds, nests, and eggs.	If State threatened or endangered species are identified within the removal areas, activities must be designed to conserve the species and their habitat.		✓	
Montana Antiquities Act, MCA 22-3-421, et seq.	Relevant and Appropriate	The Montana Antiquities Act addresses the responsibilities of State agencies regarding historic and prehistoric sites including buildings, structures, paleontological sites, archaeological sites on state owned lands. Each State agency is responsible for establishing rules regarding historic resources under their jurisdiction which address National Register eligibility, appropriate permitting procedures and other historic preservation goals. The State Historic Preservation Office maintains information related to the responsibilities of State Agencies under the Antiquities Act.	The Montana Antiquities Act requires avoidance or mitigation of impacts to heritage property or paleontological remains.		✓	
Montana Human Skeletal Remains and Burial Site Protection Act (1991), MCA 22-3-801, et seq.	Applicable	The Human Skeletal Remains and Burial Site Protection Act is the result of years of work by Montana Tribes, State agencies and organizations interested in ensuring that all graves within the State of Montana are adequately protected.	If human skeletal remains or burial sites are encountered during removal activities within OU3, then these requirements will be applicable.		✓	
Noxious Weeds, MCA 7-22-2101, et seq. and ARM 4.5.201, et seq.	Applicable	Designated noxious weeds are listed in ARM 4.5.206 through 4.5.210 and must be managed consistent with weed management criteria developed under § 7-22-2109(2)(b), MCA.	The substantive requirements set forth in these regulations are applicable where disturbed areas are seeded, planted, or otherwise managed to reestablish a cover of beneficial plants.			✓

Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
BMP	Best Management Practices
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
MCA	Montana Code Annotated
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
RACM	Regulated Asbestos Containing Material
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Office
TSCA	Toxic Substances Control Act
U.S.C	United States Code

September 14, 2012 (Rev. 2)

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

Prepared for and with oversight by:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 8

Prepared by:

MWH Americas, Inc.
2890 E. Cottonwood Parkway Suite 300
Salt Lake City, Utah 84121

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

Work Plan for Removal of Asbestos-containing Vermiculite Waste Near the "Amphitheater" at Libby Asbestos Superfund Site OU3

1.0 PROJECT OVERVIEW

While considering various alignments for re-routing Rainy Creek as part of a preliminary evaluation of potential site remediation scenarios, asbestos-containing vermiculite waste material (waste material) was discovered in October 2011 south of and below the "Amphitheater" at Operable Unit 3 (OU3). The Amphitheater is a portion of the site used for staging soil removed from OU4 (the town of Libby) before it is transported to the top of the former mine for disposal (see Figure 1).

As discovered during subsequent investigation in October 2011, the size of the waste material ranges up to 7 mm in diameter and is covered by vegetation over much of its areal extent. The material is present over approximately five acres below the Amphitheater, north and south of the Rainy Creek channel. Based on a few widely-spaced shovel-dug potholes, the estimated average thickness of the waste material is about 12 inches. Assuming these estimates, the volume of the asbestos-containing vermiculite waste material is about 8,100 cubic yards.

The waste area is well outside the naturally-occurring vermiculite deposit and it is obvious the material has been crushed and screened. The material is purported to be sediment dredged from the bottom of nearby Mill Pond (Figure 1).

1.1 Purpose of this Document

This Work Plan is intended to serve as a guide to the removal and disposal of the asbestos-containing vermiculite waste material below the Amphitheater. Because the purpose of the proposed action is simple excavation and transport of a single medium, rather than multi-media sampling for environmental characterization, detailed protocols provided in previous OU3 project sampling and analysis plans (SAPs) and standard operating procedures (SOPs) are not included herein. Relevant project SOPs are covered comprehensively in project documents produced by the United States Environmental Protection Agency, Region 8 (USEPA) for the Remedial Investigation that are available in the OU3 eRoom[1], and are incorporated by reference in this Work Plan. All work performed as part of this removal action will be in strict accordance with the requirements of the Administrative Settlement Agreement and Order on Consent for Removal Action (AOC) between USEPA and W. R. Grace & Co. (Grace).

2.0 BACKGROUND AND PROBLEM DEFINITION

2.1 Site Description

The former Zonolite vermiculite mine is a portion of OU3 of the Libby Asbestos Superfund Site. The former mine is approximately 6.5 miles east of Libby, Montana. The mining-disturbed area of the mine property is approximately 1,100 acres. Vermiculite was mined there by numerous concerns beginning in the early 20th century; from 1963 through 1990, the mine, mills and associated processes were operated by Grace. The mine was closed by Grace in 1990 due to a decrease in demand for vermiculite. As part of the Superfund designation of the Libby Asbestos Site, USEPA initiated a Remedial Investigation/Feasibility Study (RI/FS) at OU3 in October, 2007.

[1] The most recent versions of all OU3-specific SOPs are provided at: https://team.cdm.com/eRoom/mt/LibbyOU3

Aside from being the single largest known deposit of vermiculite in the world, the Zonolite deposit is unique in that it contains an assemblage of amphibole asbestos minerals known as Libby Amphibole ("LA"). Asbestos is not commonly associated with vermiculite; in the Zonolite deposit, asbestos was introduced to the vermiculite by hydrothermal waters, millions of years after the emplacement of the vermiculite.

The mined deposit is in the form of a dome, in the center of a roughly circular basin rimmed with Precambrian Belt Formation limestone and quartzite. The rim is from 400 to 900 feet above the top of the mine. The basin is drained by Fleetwood Creek (around the north flank of the vermiculite dome) and by Carney Creek around the south flank. These creeks are tributaries to Rainy Creek, a much larger stream that heads at an elevation of 5,500 feet on the slope of Blue Mountain, about five miles north-northwest of the mine. Rainy Creek and Fleetwood Creek flow into the mine tailings dam. High water flows during spring snowmelt that cannot be contained by the dam flow through a box culvert and a spillway, re-joining the Rainy Creek channel below the dam. Carney Creek joins Rainy Creek downstream of the tailings dam and the Mill Pond (see Figure 1). From the area of the mine, Rainy Creek flows southwest about two miles to the Kootenai River, a major tributary to the Columbia River system.

2.2 Problem Definition

Based on field investigation in October 2011, the channel of Rainy Creek flows near or through the waste vermiculite below the Amphitheater and may be a source of elevated LA levels detected in lower Rainy Creek. To eliminate or mitigate this potential continuing source of LA to lower Rainy Creek, the asbestos-containing vermiculite waste material will be excavated and transported to the disposal area at the top of the former mine that is used to dispose of LA-containing soil removed as part of the remediation of OU4, the town of Libby.

3.0 SUMMARY OF EXISTING SITE DATA

3.1 Asbestos-containing Vermiculite Waste Material

Three samples of the waste vermiculite were collected by personnel from Chapman Construction on October 27, 2011. The sample locations are depicted on Figure 1. The samples were analyzed by EMSL Laboratories in Libby, Montana by NIOSH PLM Method 9002, Issue 2. As shown on Figure 1, Sample 1 reported a result of 4% LA, Sample 2 reported 3% LA, and Sample 3 reported 4% LA. The sample chains-of-custody, analytical sheet and the test report are included in Attachment 1 of this work plan.

Further investigation of the nature, thickness, and extent of the vermiculite waste was performed in July 2012. A tire-mounted backhoe was used to excavate 19 test pits across the affected area. Two basic types of waste were found in the test pits: a coarse-grained greenish-black material (primarily located north of Rainy Creek), and a fine, powdery bronze material most prevalent south of Rainy Creek. Waste thickness ranges from less than one inch near the margins to more than 3 feet in berms and piles on the area south of Rainy Creek.

4.0 REMOVAL AND DISPOSAL OF WASTES

4.1 Kickoff Meeting

A project kick-off meeting will be held prior to the start of waste material removal field operations. The meeting will be held at the Grace decontamination area on Highway 37, just east and across from the OU3 security gate. Topics for discussion at the meeting will include confirmation of project objectives, removal methods, characterization sampling, OU3 traffic rules and procedures and health and safety. Attendees will include project personnel from MWH and Chapman Construction and interested parties from PRI-ER, CDM Smith, Montana DEQ and.

4.2 Site Preparation

The work area will be flagged with "Caution" tape to prevent unauthorized persons from entering the waste removal area. A haul road out of the removal area will be improved if necessary, or constructed along the west margin of the Amphitheater to allow haul trucks to avoid traveling on the paved portion of Rainy Creek Road and to prevent traffic congestion at the Amphitheater transfer and decontamination area. To permit movement of trucks and equipment between the two removal areas north and south of Rainy Creek without using Rainy Creek Road, a bridge will be placed across Rainy Creek.

4.3 Storm Water/Sediment Control

The *Construction Operations Best Management Practices (Stormwater Management Plan) Operable Unit 3 Libby Asbestos Superfund Site, Libby, Montana* (USEPA, 2012) will be used as general guidance for the asbestos-containing vermiculite waste removal project and is incorporated by reference herein. Best Management Practices (BMPs) will be applied as appropriate to the conditions of the removal work site to ensure protection of the environment. The *Stormwater Management Plan* does not include best practices for all activities and potential activities that will be included in the waste removal action. Areas immediately adjacent to the banks of Rainy Creek along the reach of Rainy Creek that flows through the removal work site will require special procedures to prevent waste material from entering the stream (e.g., raking, removal by hand). Although initial examination suggests waste removal work will not be extensive along the banks of Rainy Creek, MDEQ and the Lincoln County Conservation District will be apprised and consulted prior to performing any work that has a potential to impact the stream.

Before removal of asbestos-containing vermiculite waste material, the outer edge of the waste removal area will be located. Once the outer edge of the waste removal area is located, the asbestos-containing vermiculite waste material will be removed from the perimeter of the work area and a silt fence will be immediately installed on the outside perimeter of the waste removal area. The silt fence will be installed to prevent sediments from running onto or off the waste removal area and will be installed around the entire perimeter of the work areas. Water that flows through the silt fence will be conducted around the waste removal site and diverted toward vegetated areas and away from Rainy Creek until vegetation is established on the waste removal site.

4.4 Excavation and Loading

Excavation of the waste material over much of the work area will be done with a track-mounted excavator to more precisely remove the waste material and minimize the amount of over-excavation and creation of excess waste volume to be transported and disposed. Excavator operators will take care to preserve the small trees that line the bank of Rainy Creek. If waste material is found to be around the base of these

trees or adjacent to the banks of Rainy Creek, it will be carefully removed by hand and if necessary, replaced with topsoil from OU4 that is stockpiled at the Amphitheater. If required, waste immediately adjacent to the banks of Rainy Creek will be removed by hand methods only.

Excavated materials will be placed in 10-cubic-yard dump trucks and transported to the disposal area. The haul truck route will be through or around the Amphitheater and will specifically avoid the paved section of Rainy Creek Road, where only properly decontaminated vehicles may travel.

During excavation and loading, the excavator, dump trucks and material to be excavated and removed will be continuously sprayed with water to suppress dust and prevent potential release of LA fibers into the atmosphere Dust suppression water (and all water used during the project) will be obtained from approved sources at locations outside OU3. MWH and Chapman Construction on-site personnel will follow the practices defined in their respective employers' OU3-specific Health and Safety Plans and will strictly adhere to the decontamination procedures in place at the Amphitheater prior to leaving the designated OU3 area.

4.5 Limit of Material Removal

The asbestos-containing vermiculite waste material has a greenish cast, a distinctive texture and a clearly visible, abrupt contact with the underlying dark native soil. A memorandum by Mark Nelson, P.G., of CDM is a summary of field observations he made of test pits in the waste area on August 8, 2012. His memo confirms the easily discriminated contrasts between the waste vermiculite and the native soil and is contained in Attachment 4 to this Work Plan. These visible and textural differences will be used to guide the depth of excavation and the area over which the waste will be removed. To avoid leaving waste material in-place, a small amount of assumed native soil will be over-excavated and disposed with the waste material. In addition to using the visible contrast between the waste material and the native soil to determine the depth and area of waste removal, characterization samples will be collected as discussed in Section 5.0 of this document and analyzed as discussed in Section 5.2. Additional details on sample collection are contained in the SAP/QAPP (Part B of this Work Plan).

4.6 Transport and Dumping

Filled dump trucks will travel about four miles up the main mine haul road and will place the waste material in USEPA-designated areas (See Figure 2). Because the waste material has been analyzed to contain greater than 1% LA, it will be covered with OU4 soils, as was done with disposed soils removed from OU2. Traffic control for the trucks hauling the vermiculite waste from the Amphitheater area will be coordinated with PRI-ER to ensure safe and efficient policies and practices are in place. Once all of the vermiculite waste has been removed and transported, soils from OU4 will be used as cover at the designated site and seeded with an MDEQ-approved grass mixture. Based on the estimated volume of waste materials, more than 900 truckloads of vermiculite waste will be transported to the top of the former mine, over a period of 30 to 60 days.

4.7 Site Restoration

The original, natural surface of the waste removal site is not known. The working assumption is that the waste material was placed on natural grade and that removal of the waste will restore the surface of the work site to the natural grade, but this will not be known until waste removal commences. Should additional soil be needed to adjust grade or fill erosional features or areas that may impound surface water, OU4 topsoil stockpiled at the Amphitheater may be used. Regardless of whether natural grade can

be determined, the finished surface will control surface water runoff from altering or eroding the waste removal area or Rainy Creek where it passes through the waste removal area. As further protection, silt fencing will be installed around the perimeters of the work areas and along both banks of Rainy Creek where it flows through the removal area.

4.7.1 Regrading

Regrading of the waste removal area will focus on creating a stable surface capable of supporting an appropriate mix of vegetation and preventing erosion. Regrading of the waste removal area will, to the extent possible at the time, be compatible with the regrading plans of the adjacent Amphitheater waste staging and transfer area.

4.7.2 Revegetating

A site-appropriate seed mix approved by MDEQ will be planted on the final surface of the waste removal area. Establishment of high-quality, approved vegetation will be a vital component to site stabilization. The restored area will be inspected at least monthly during Remedium contractor visits to the former mine area to inspect the dam and other features of the site. Because the restored waste-removal area is immediately adjacent to Rainy Creek Road, inspections to confirm that vegetation is healthy and free of noxious weeds, silt fences are in good repair, and that erosion is controlled will be easy and frequent. Silt fencing will remain in good repair until USEPA determines the site is stable without them. If needed, the silt fence will be repaired by re-staking, patching or replacement to ensure it remains effective in controlling sediment transport onto or off of the waste removal area.

4.7.3 Channel Stabilization/Realignment

The current approach to the waste removal does not involve changing the channel of Rainy Creek. Based on field observations, the existing channel is stable, established, and will not require stabilization or realignment.

4.7.4 High Water-Table and Seasonal Ponding

The current approach to waste removal and site restoration does not include backfilling to maintain grade or eliminate occasional or seasonal ponding of water. Small ephemeral ponds and areas of shallow standing water are produced seasonally throughout the mine area, particularly during snowmelt and on relatively flat, apparently natural-grade canyon floors. If waste removal reveals that the original, natural ground surface was not modified, but was simply covered and buried by waste, backfilling may not be necessary to restore the site and a stable, controlled-drainage surface. If channels or other erosional features are found on the native soil surface and backfill is needed to stabilize the surface and prevent erosion, OU4 soils stockpiled at the Amphitheater staging and transfer area will be used as backfill at the waste removal site.

4.8 Applicability of Montana Preservation Acts and Permitting

Portions of the channel of Rainy Creek were significantly altered to serve historic mine operations. The creek is currently impounded by the tailings impoundment dam and flows through drains along the toe of the dam or (during high flow rates from spring snowmelt) over a concrete spillway. Modifications to the stream course below the dam were made to store Rainy Creek water and collection structures were

installed to provide water to various mine processes, including mills. No alterations to the Rainy Creek channel will occur during the Amphitheater waste removal work.

4.8.1 Montana Natural Streambed and Land Preservation Act ("310 Permit")

Activities requiring a 310 Permit include "*Any activity that physically alters or modifies the bed or banks of a perennially flowing stream.*" As currently planned, the removal action will not require the alteration or modification of the bed or banks of Rainy Creek. BMPs (USEPA, 2012) will be implemented to protect the creek and the aquatic environment where Rainy Creek flows through the vermiculite waste area. Special methods to be employed near the stream (raking, hand-removal) are discussed in Section 4.4.

The purposes of the Montana Natural Streambed and Land Preservation Act are:

- *To minimize soil erosion and sedimentation.* Care will be taken and BMPs (USEPA, 2012) will be employed to ensure that removal activities will not increase erosion or sedimentation.
- *To protect and preserve streams and rivers in their natural or existing state*. Rainy Creek is not in a "natural state" from the north end of the tailings impoundment to the confluence with the Kootenai River, a distance of approximately three miles. There are numerous diversions through relict mine water collection and distribution works and through culverts under roads that were used to move the channel to accommodate Rainy Creek Road. BMPs will be used to ensure that the reach of Rainy Creek that flows through the waste removal area will be preserved in its existing state.

4.8.2 Montana Stream Protection Act (SPA 124 Permit)

Activities requiring an SPA 124 Permit include "Any project including the construction of new facilities or the modification, operation, and maintenance of an existing facility that may affect the natural existing shape and form of any stream or its banks or tributaries." The proposed waste removal action does not include construction, modification, operation or maintenance of an existing facility. The action will not alter the existing shape and form of the reach of Rainy Creek that flows through the waste removal area.

The purposes of the Montana Stream Protection Act are:

- *To protect and preserve fish and wildlife resources.* BMPs (USEPA, 2012) will be employed to ensure fish and wildlife resources are protected. Samples of water from Rainy Creek will be collected and analyzed for LA before, during and after removal operations to document any effects that may be related to the project. It is important to recognize, however, that LA concentrations in Carney Creek (which is tributary to Rainy Creek upstream of the removal work site) can be very high (it drains a waste-rock pile on the south flank of the former mine) and may create LA concentrations that are not representative of the quality of Rainy Creek above the confluence. To allow estimation of the LA contributions from Rainy Creek and Carney Creek, water samples will be collected for LA analysis bi-weekly from each creek, above their confluence, and from sampling station LRC-06, just upstream of where Rainy Creek passes through a culvert beneath Highway 37.

  To maintain streams and rivers in their natural or existing state. The removal action will be performed such that the existing course, character and state of Rainy Creek will not be altered.

4.9 Health and Safety

Project health and safety will follow guidance contained in the OU3-specific Health and Safety Plan (MWH, 2007), although each employer or contractor is responsible for providing and enforcing their own Health and Safety Plan (HASP), which shall be at least as protective of worker health and safety as the MWH HASP.

All personnel who will be involved in the removal have more than five years of experience in on-mine operations at OU3 and are familiar with site controls, driving rules, decontamination procedures and the proper use of Modified Level C personal protective equipment (PPE). The standard PPE for on-site work at OU3 consists of a full-face respirator fitted with P100 filter cartridges, two layers of footed/hooded Tyvek® coveralls, two layers of nitrile gloves taped to the wrists of the coveralls and latex boot covers taped to the legs of the coveralls. Rules for use of the haul road and coordination with other heavy equipment will be discussed with PRI prior to beginning the work.

To document that dust suppression efforts are effective during active excavation and loading, visual observation of the air around the work site will be made throughout the day by site personnel so that any needed changes to the dust suppression procedures can be made quickly.

5.0 CHARACTERIZATION SAMPLING

5.1 Sampling Locations

The five-acre waste removal area will be surveyed and divided into a grid of approximately fifteen 15,000 square-foot sampling cells. Characterization soil samples will be 30-point composite samples collected from the approximate center of each cell. Approximately 20 characterization samples will be collected and analyzed (see Section 5.10 for analysis requirements).

5.2 Sample Collection

Characterization soil samples will be collected in accordance with SOP No. 1, available in the OU3 eRoom. Samples will be placed in certified-clean sample containers provided by the laboratory and labeled with OU3-specific index identification labels provided by USEPA. A minimum of 10% replicate samples will be randomly collected and submitted "blind" to the laboratory, using fictitious but consistent identification numbers, to evaluate analytical quality. Index I.D. labels will be furnished by MWH and will bear the prefix VW ("vermiculite waste"). All sample QA/QC requirements are contained in Part B of this work plan, the QAPP.

5.3 Sampling Equipment Decontamination

It is anticipated that single-use sampling implements (e.g., trowels, spoons) will be used to collect characterization soil samples. If any non-dedicated (multiple-use) sampling equipment is used it will be decontaminated in accordance with SOP No. 7.

5.4 Sample Location Documentation

Sample locations and excavation boundaries will be flagged in the field and will be recorded using a hand-held global positioning system instrument, in accordance with SOP No. 11. This information will be recorded in the field logbook and on project-specific field sample data sheets (FSDS; an example of which is provided in Attachment 2).

5.5 Sample Handling

Characterization soil samples will be handled in accordance with SOP No. 8.

5.6 Field Documentation

Field logbooks, field sample identification, field sample data sheets, project photographs and sample labeling and sample chain-of-custody (COC) will be in accordance with SOP No. 9. An example project-specific COC is provided in Attachment 3.

5.7 Delivery of Samples

The sampling personnel will hand-deliver the characterization soil samples to the CDM Smith Soil Preparation Facility (SPF) in Troy, Montana the same day they are collected. If samples collected later in the day cannot be delivered before the SPF closes, they will be retained in the custody of the sampling personnel and be delivered the next day; there is no holding time or preservation requirement for samples of asbestos in soil, so data quality will not be affected.

5.8 Soil Sample Preparation

If required by USEPA, the soil samples will be prepared according to SOP ISSI-LIBBY-01 prior to analysis.

5.9 Analysis of Samples

Once the soil characterization samples have been prepared by the SPF, they will be shipped to MAS Laboratories of Suwanee, Georgia for analysis by PLM-VE according to Modified NIOSH Method 9002, Issue 2 under normal turn-around time.

5.10 Final Decontamination of Equipment

Chapman personnel will thoroughly decontaminate all excavation and hauling equipment at the conclusion of the project. All decontamination will follow standard procedures implemented at the Amphitheater site and will use off-site water. Decontamination will consist of complete removal by pressure washing of all soil, mud, and debris from all exposed surfaces of the equipment. Decontamination shall include removal and replacement of engine air filters. Decontaminated equipment will be inspected by CDM Smith personnel before it is allowed to leave the designated OU3 site.

6.0 PROJECT ROLES AND RESPONSIBILITIES

Earthmoving equipment and operators will be provided by Chapman Construction, Inc. of Libby, Montana (Chapman). Chapman will provide transportation of all project personnel to and from the work site and will be responsible for decontaminating all equipment used on the project. Project direction and oversight will be provided by MWH Americas, Inc. (MWH) personnel based in Salt Lake City, Utah. MWH will direct the removal of the waste material, maintain a written and photographic record of project activities, collect and maintain documentation and custody of samples, and deliver the samples to the laboratory. EPA will provide oversight along with its designated contract consultant.

7.0 LABORATORY ANALYSIS REQUIREMENTS, QUALITY CONTROL, DATA MANAGEMENT, ASSESSMENT AND OVERSIGHT, DATA VALIDATION AND USABILITY

Analytical laboratory and data quality requirements for the project will be in accordance with those detailed in the OU3-specific SOPs, as applicable and appropriate, and as modified by any special or project-specific requirements issued by USEPA. Any modifications will be specified in appropriate Record of Modification forms.

8.0 REPORTING

All reporting requirements specified in Section VIII of the AOC will be followed (e.g., progress reports, final report). At the conclusion of waste removal activities, MWH will prepare a summary report of site preparation, methods of waste removal, volume removed, analytical results for characterization samples, a map of the work area and locations of characterization samples. The report will include GPS coordinates for sample locations and points around the excavation area and photographs to document project activities.

9.0 REFERENCES

MWH, 2007: MWH Health and Safety Plan for Libby Asbestos Superfund Site, Revision 1, dated September 27, 2007.

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

U.S. Environmental Protection Agency Region 8, 2011: Libby Asbestos Superfund Site Operable Unit 3 Soil Disposal Plan.

U.S. Environmental Protection Agency Region 8, 2012: Construction Operations Best Management Practices (Stormwater Management Plan) Operable Unit 3 Libby Asbestos Superfund Site, Libby, Montana, working draft dated March 27, 2012.

FIGURES

\\Ussle1s01\FO_CAD\LIBBY_MONTANA\NEW Figure 1 Waste Removal Project Location.ai 11 Sep 2012

LEGEND

- Asbestos sampling location
- Test pit
- Contours 10 ft
- Contours 2 ft
- Estimated margin of waste vermiculite
- Margin concealed, inferred or otherwise not confirmed by excavation

N
W E
S

0 50 100 150 200
Feet

TITLE:
Waste Removal Project Location

PROJECT:
Libby, MT

REFERENCE(S): Coordinate System: NAD 1983 HARN StatePlane Montana FIPS 2500 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983 HARN
Units: Foot

MWH

Remedium

FIGURE
1

LEGEND

- Vermiculite Waste Removal Area
- Vermiculite Waste Disposal Location

N
W E
S

0 650 1,300 2,600

Feet

TITLE: **Vermiculite Waste Disposal Location**

PROJECT: Libby Asbestos Superfund Site OU3

REFERENCE(S): Imagery NAIP 2011:
NAD 1983 HARN StatePlane Montana
Units: Meters

MWH

Remedium

FIGURE **2**

ATTACHMENTS

ATTACHMENT 1

Chains-of-Custody and Test Reports for Vermiculite Samples Collected on October 27, 2011.

INTERNAL CHAIN OF CUSTODY

10/27/2011 2:47:07 PM

Order ID: 271101481

Attn: Robert Marriam
Remedium Group, Inc.
Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Fax: (901) 820-2061 Phone: (901) 820-2023

Project: **Sample Retrieval Below Amphitheater**

Customer ID: REME44
Customer PO:
Received: 10/27/11 1:07 PM

EMSL Order: 271101481
EMSL Proj ID: OU3 Mine, Libby, MT
Cust COC ID

Test: PLM NIOSH 9002 **Matrix** Soils **TAT:** 6 Hour **Qty:** 3

Acct Sts: N30 **Slsprsn:** rdemalo **Logged:** rmahoney **Date:** 10/27/2011

Inter- Lab Sample Transfer

Samples Relinquished: _____ Date _____
Samples Received: _____ Date _____
Package Mailed to Westmont: _____ Date _____
Method of Delivery: _____

Includes: (Circle)
Benchsheets Sample Slides Sample filters
Micrographs GridBox Other_____

Final Package Received: _____ Date: _____

Sample Condition: ☒ Acceptable ☐ Unacceptable

Comments

Initial Prep (Initials/Lab): KC **Date:** 10/27/11
Filter Prep (Initials/Lab): _____ **Date:** _____
Grid Prep (Initials/Lab): _____ **Date:** _____

For Special Projects Use Only:

QC Selection: _____ **Date:** _____
Date Package Review: _____ **Date:** _____
Date Package Mailed: _____ **Date:** _____

Special Instructions

Order ID	Lab Sample #	Cust. Sample #	Location	Due Date
271101481	271101481-0001	1	N.W. Corner	10/27/2011 7:07:00 PM
271101481	271101481-0002	2	Next to ISCO	10/27/2011 7:07:00 PM
271101481	271101481-0003	3	S.E. Corner	10/27/2011 7:07:00 PM

Asbestos Chain of Custody

EMSL Order Number (*Lab Use Only*): 271101481

REME44

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL ANALYTICAL, INC.
107 W. FOURTH ST.
LIBBY, MT 59923
PHONE: (406) 293-9066
FAX: (406) 293-7016

Company: CHAPMAN CONSTRUCTION	**EMSL-Bill to:** ☐ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: P.O. BOX 516	*Third Party Billing requires written authorization from third party*
City: LIBBY, MONTANA **State/Province:** MT	**Zip/Postal Code:** 59923 **Country:** USA
Report To (Name): MIKE CHAPMAN	**Fax #:** 406-293-8305
Telephone #: 406-293-1983	**Email Address:** chapman@montanasky.net
Project Name/Number: SAMPLE RETRIEVAL BELOW AMPHITHEATER	
Please Provide Results: ☐ Fax ☒ Email **Purchase Order:**	**U.S. State Samples Taken:**

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☒ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

**For TEM Air 3 hours/6 hours, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT (AHERA only)**
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

KC 10/27/11

☐ **Check For Positive Stop – Clearly Identify Homogenous Group**

Samplers Name: MIKE CHAPMAN **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
#1	N.W. Corner		10/27/11 - 12:15 p.m.
#2	Next to ISCO		10/27/11 - 12:20 p.m.
#3	South East Corner		10/27/11 - 12:25 p.m.

Client Sample # (s): - **Total # of Samples:** 3

Relinquished (Client): **Date:** 10-27-11 **Time:** 1:07

Received (Lab): R.K. Mahoney **Date:** 10/27/11 **Time:** 1307

Comments/Special Instructions:

EMSL Analytical, Inc.
107 West 4th Street, Libby, MT 59923
Phone: (406) 293-9066 Fax: Email: mobileasbestoslab@emsl.com

Attn: **Robert Marriam**
Remedium Group, Inc.
Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Fax: (901) 820-2061 Phone: (901) 820-2023
Project: **Sample Retrieval Below Amphitheater**

Customer ID: REME44
Customer PO:
Received: 10/27/11 1:07 PM
EMSL Order: 271101481

EMSL Proj: OU3 Mine, Libby, MT
Analysis Date: 10/27/2011

Test Report: Polarized Light Microscopy (PLM) Performed by Modified NIOSH Method 9002, Issue 2

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1 *271101481-0001*	N.W. Corner	Tan, Black Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	85% Mica 11% Non-fibrous (other)	4% **Tremolite/ Actinolite**
2 *271101481-0002*	Next to ISCO	Tan Non-Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	95% Mica 2% Non-fibrous (other)	3% **Tremolite/ Actinolite**
3 *271101481-0003*	S.E. Corner	Tan, Black Non-Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	94% Mica 2% Non-fibrous (other)	4% **Tremolite/ Actinolite**

Initial report from 10/27/2011 16:12:59

Analyst(s)
Kelly Colberg (3)

R. K. Mahoney, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

Polarized Light Microscopy (PLM) Performed by Modified NIOSH Method 9002, Issue 2

Client: Remedium Group, Inc. | Logged: 10/27/11 | TAT: 6 Hour

Address: Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Date/Time Due: 10/27/2011 7:07:00 PM

Fax: (901) 820-2061

Project: OU3 Mine, Libby, MT
Sample Retrieval Below Amphitheater

Special Instructions	Order Number
	271101481

Macroscopic

COLOR (C): 1 Brown, 2 Gray, 3 Tan, 4 White, 5 Red, 6 Various, 7 Black, 8 Silver, 9 Blue, 10 Yellow

TEXTURE (T): 1 Fibrous, 2 Non-Fibrous, 3 Other

HOMOGENEITY (H): 1 Homogeneous, 2 Heterogeneous, 3 OTHER, 4 Layers (#)

Treatment: 1 Teased, 2 Crushed, 3 Dissolve, 4 Ashed, 5 Heated, 6 Melted

COMPONENT TYPES

Asbestos: 1 Chrysotile, 2 Amosite, 3 Anthophyllite, 4 Tremolite, 5 Actinolite, 6 Crocidolite

Fibrous: 7 Cellulose, 8 Glass, 9 Min. Wool, 10 Synthetic, 11 Other, 12 Wollastonite, 13 Hair

Non-Fibrous: 14 Quartz, 15 Mica, 16 Gypsum, 17 Cal. Carbonate, 18 Matrix, 19 Perlite, 20 Other

MICROSCOPIC

Optical Properties

Morphology (M): 1 Wavy, 2 Straight, 3 Uniform Diameter, 4 Ribbon-Like, 5 Tapered Ends, 6 Scaled, 7 Pitted, 8 Medulla, 9 Exotic Shapes, 10 Other

Sign of Elongation (S): 1 +, 2 -, 3 Variable

Pleochroism (P): 1 Yes, 2 No

Birefringence (B): 1 Low 0.010, 2 Med 0.010-0.050, 3 High >0.050, 4 None 0.00 or Isotropic

Fiber Color (FC): 1 White, 2 Brown, 3 Beige, 4 Blue, 5 Green, 6 Colorless

Extinction (E): 1 Parallel, 2 Symmetrical, 3 Oblique, 4 Undulose

Sample	Macrosc.	Treat	Stereo Asbestos Est. %	Asbestos Type	% of Asbestos	Other Fibrous Type	Other Fibrous %	Non-Fibrous Type	Non-Fibrous %	Non-Asb Char. Ex. E4	Optical Properties
1	(C) 3,7	2,1	4	4/5	4			20	11		1.630 R.I. ⊥ / 1.637 R.I. ∥
	(T) 1							15	85		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
2	(C) 3	2,1	3	4/5	3			20	23 (10/27/11)		1.625 R.I. ⊥ / 1.631 R.I. ∥
	(T) 2							15	95		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
3	(C) 3,7	2,1	4	4/5	4			20	2		1.625 R.I. ⊥ / 1.633 R.I. ∥
	(T) 2							15	94		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)	Samples 1 & 3 are relatively the same coarseness,									P / B / (FC) / E
	(C)	micas range in size from 3 mm to 1 cm, Libby									∥ R.I.
	(T)	Amphibole bundles in these two samples are similar									S
	(H)	in size as well; none were larger than about 7 mm in length.									P / B / (FC) / E
	(C)	Sample 1 contains feldspar and diopside along with									∥ R.I.
	(T)	vermiculite & biotite and Libby Amphibole. Feldspars were									S
	(H)	not observed in Sample 3.									P / B / (FC) / E
	(C)	Sample 2 is fine in texture & consisting primarily									∥ R.I.
	(T)	of vermiculite. The Libby Amphibole bundles are → 1 or 2 mm									S
	(H)	Small and fine, ~~for~~ none greater than ~~5 mm~~ in length.									P / B / (FC) / E
	(C)	The vermiculite is ranges in size from 2 mm to 4 mm.									∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E

Analyst: KColberg Date: 10/27/11 Computer: _____ Date: _____

Room Temp (C): 21.2

Instructions: **All applicable data package deliverables are included in the following page. Using the print option will print out all forms necessary and in the appropriate order. Please provide information as directed.**

Laboratory Name: EMSL Analytical, Inc.
City/State: Libby, MT
Laboratory Job No.: 271101481
Method Utilized (SOP and Rev. No.): NIOSH Method
Circle One: Visual Estimation (NIOSH 9002) Point Counting Approach

Instructions: For PLM analytical results raw data packages, complete and sign the following checklist. Attach supporting documentation as outlined below. Organize the supporting documentation in the order listed below. Paginate the completed raw data package.

		Laboratory Verification (Initials and Date)	Validator Verification (Initials and Date)
1	**Number of samples received: 3** *An SDG is defined as no more than 100 samples.* **Additional Supporting Documentation:** Attach COC forms having footer R (report).	KC 10/27/11	
2	**Date of sample receipt and condition of samples** 10/27/2011 OK *For Condition of samples enter "OK" or "See SDG Case Narrative".*	KC 10/27/11	
3	**SDG Case Narrative:** **Additional Supporting Documentation:** Attach SDG Narrative and any modification forms.	KC 10/27/11	
4	**Check for contamination (daily):** Wipe microscope slides with lens paper before using. *Laboratory Verification initial and date signifies that this has been performed for the samples in this SDG.*	KC 10/27/11	
5	**Verification of the refractive indices of the refractive index liquids once per month:** **Additional Supporting Documentation:** Provide information indicating a monthly record of checking each of the four liquids including liquid name, lot number and analyst initials. (See table - Results of RI Liquids Calibration)	KC 10/27/11	
6	**Verification of microscope adjustments prior to each SDG:** *Laboratory Verification initial and date signifies that this has been performed for the samples in this SDG.*	KC 10/27/11	
7	**Hard copy data forms (as presented in the EDD spreadsheet):** **Additional Supporting Documentation:** Copies of the Hard Copy Data Forms for all investigative samples and laboratory duplicates will be provided from systems that are entered electronically.	KC 10/27/11	
8	**Bench sheets for data results:** **Additional Supporting Documentation:** Provide copies of the hand written or LIMS system generated raw data sheets for sample results.	KC 10/27/11	

ATTACHMENT 2

Field Sample Data Sheet for Characterization Soil Sampling

LIBBY OU3 PHASE FIELD SAMPLE DATA SHEET
CHARACTERIZATION SOIL SAMPLES

Station ID:_______________ **Sampling Date**:_______________
Field Logbook ID: ____ **Logbook Page No**:____________
For New Stations Only: **X coord:**______________ **Y coord:** ______________ **Elev:** ______________
GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters
Sampling Team: **MWH** **Samplers Initials:**____

Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type: Field Sample** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**__________ **Sampling Depth:**__________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**__________ **Sampling Depth:**__________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**__________ **Sampling Depth:**__________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type:** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**__________ **Sampling Depth:**__________

COMMENTS:	

Notes:

FS Field Sample	**SP** Field Split Sample	**FD** Field Duplicate Sample
TB Trip Blank Sample	**MS** Matrix Spike Sample	**MSD** Matrix Spike Duplicate Sample
FB Field Blank Sample	**EB** Equipment Decon Blank Sample	**PE** Performance Evaluation Sample

Field Data Recorded by:		**Field Entries Checked by:**	

Database Entry by:	*Database QC by:*

ATTACHMENT 3

Chain-of-Custody Form for Characterization Soil Sampling.

LIBBY OU3 – CHARACTERIZATION SOIL SAMPLES CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

COC No. ________________

PAGE: _______ OF: _______

ENTERED BY (Signature): ______________________________ PROJECT MANAGER: __________________________________ DATE: ____________________

METHOD OF SHIPMENT: ______________________________ CARRIER/WAYBILL NO.: ________________ DESTINATION: ______________________________

SAMPLES					ANALYSIS REQUEST																												
					Asbestos			Non-Asbestos (a)																									
Index ID	Date	Time	Medium	Archive	TEM-ISO 10312 (b,c)	PLM (d)		TAL Metals+Boron	Mercury	TOC	DOC	Paste pH	Fluoride	Chloride, Sulfate	Total Phosphorus	Cyanide	VPH	EPH	OPP Pesticides	Chlorinated Pesticides	Herbicides	PCBs	SVOCs	VOCs	TDS, TSS, Nitrite, Alkalinity	Ammonia, Nitrate, TKN	Orthophosphate	Radiochemistry	Radium, Uranium				Remarks

	TOTAL NUMBER OF CONTAINERS	LABORATORY COMMENTS/CONDITION OF SAMPLES

RELINQUISHED BY:			DATE	TIME	RECEIVED BY:		
SIGNATURE	PRINTED NAME	COMPANY			SIGNATURE	PRINTED NAME	COMPANY

** Media: AQ - Aqueous SO – Solid AA – Ambient Air BK – Tree Bark DB – Organic Debris TC – Tree Age Core*

Notes --

(a) Method, container, and preservation details are provided in the attached tables

(b) With Libby-specific modifications. See Phase I OU3 SAP for counting and stopping rules

(c) For tree bark, preparation by TREE-LIBBY-OU3 rev0. For organic debris, preparation by DEBRIS-LIBBY-OU3 rev0

(d) Preparation by ISSI-LIBBY-01 rev8 and analysis by SRC-LIBBY-01 rev2 (PLM-Grav) and SRC-LIBBY-03 rev2 (PLM-VE)

DISTRIBUTION: PINK: Field Copy YELLOW: Return to Originator WHITE: Laboratory Copy

ATTACHMENT 4

August 20, 2012 Memo on Field Visit to Vermiculite Waste Pits from Mark Nelson, P.G., CDM Smith to Christina Progess, EPA

Memorandum

To: *Christina Progess, EPA Remedial Project Manager*

From: *Mark Nelson, PG*

Date: *August 20, 2012*

Subject: *August 8, 2012 Field Visit to the Former Vermiculite Mine, Operable Unit 3, Libby Asbestos Superfund Site, Libby, Montana*

On August 8, 2012, Mark Nelson PG, CDM Smith, attended a field visit to an area along Rainey Creek approximately 300 feet downstream from the mill pond where materials containing vermiculite are present. These materials are reported to have been produced during dredging of material from the mill pond and discharge of those materials to areas adjacent to Rainy Creek downstream from the mill pond (John Garr, MWH, personal communication August 8, 2012). These materials are referred to as "dredge spoils" in the sections that follow. Mr. Nelson was accompanied on this field visit by John Garr and Joan Kester (MHW), and Mike Chapman (earthwork contractor for MWH).

The purpose of this field visit was to observe the geological characteristics of the dredge spoils and to discern if the spoils could be delineated visually during a potential removal action currently being considered by EPA. Based on physical characteristics of the dredge spoils observed during the field visit and discussed below, delineation of these materials based on visual characteristics is viable using a weight of evidence approach based on the following characteristics:

- Mineralogical composition
- Color
- Grain size
- Soil structure
- Fluvial bedding

These characteristics are described in the following sections. It is recommended that delineation be conducted during excavation by a geologist with site-specific knowledge of contaminant source materials in the OU3 area.

Although visual delineation of the dredge spoils is viable to support the removal action, the visual characteristics are not adequate to discern between soils or sediments affected by physical dispersion of dredge spoils in the area and unaffected or "background" soils and sediments. However, visual delineation would be suitable to identify major accumulations of dredge spoils and to support a removal action to prevent future erosion of the identified dredge spoils into Rainy Creek.

Field Characteristics of Dredge Spoils

During the August 8, 2012 field visit, a series of small excavations was observed and several of these excavations were deepened using a backhoe to better expose the contact between the dredge spoils and underlying alluvial sediments. This field investigation included observation of approximately six excavations on the west side of Rainey Creek, observation of Rainey Creek sediments and adjacent riparian areas, and observation of approximately four excavations on the east side of Rainey Creek.

Photo 1. Excavation on west side of Rainey Creek showing an approximately 10-inch layer of dredge spoils overlying alluvial sediments.

Several physical characteristics that would facilitate visual delineation of the dredge spoils are shown in Photo 1, which was taken at one of the excavations located on the west side of Rainey Creek. The dredge spoils are evident as a surface layer overlying alluvial sediments. Based on

visual analyses, the dredge spoils at this location are composed of approximately 80 percent sand sized grains of micaceous minerals including biotite and vermiculite. In contrast, the underlying alluvial sediments are composed of clay, silt, and sand-sized fluvial sediments with local gravel and cobbles. The dredge spoils also exhibit a characteristic grayish-brown color, which contrasts with the medium-brown color of the underlying alluvial sediments.

Photo 2. Close-up photo of dredge spoil materials showing coarse sand grain size and characteristic color.

Photo 2 is a close-up photo of the dredge spoils showing coarse sand grain size and characteristic color. The grain size of the dredge spoils varies and ranges from coarse sand to fine sand, but the spoils commonly exhibit the characteristic mica-rich mineralogy with visual estimates ranging from 50 to 80 percent micaceous minerals.

A general lack of soil structure is also evident in the dredge spoils, which contrasts with the soil structure evident in the underlying alluvial sediments. Soil structure is affected by the clay content of the soil and other factors. The soil structure of the dredge spoils is not well-developed because the spoils contain relatively less clay as compared to underlying alluvial sediments, and the sand-sized micaceous grains generally do not adhere together well or form clumps. The soil structure of the relatively coarse grained dredge spoils is single grained and unconsolidated. In the fine sand sized dredge spoils, this leads to a fluffy unconsolidated texture. In contrast, the underlying alluvial sediments contain relatively more clay, which results in a blocky soil structure in which blocks or clumps of soil are observed during excavation. This contrast in soil structure would also support delineation of dredge spoils based

on visual characteristics during a potential removal action.

Photo 3. Bedding present in alluvial sediments underlying dredge spoils.

Photo 3 shows fluvial bedding that is evident in the alluvial sediments that underlie the dredge spoils. The surface layer of dredge spoils is evident in the photo based on the lighter grey-brown color. Underneath this zone is a sequence of alluvial sediments that exhibit characteristics of fluvial deposition including the presence of lenses of coarse sand, gravel and cobbles. These lenses of coarser grained sediments were emplaced during deposition under local higher-energy flow regimes within stream channels. The presence of this characteristic fluvial bedding in underlying alluvial materials would also support delineation of overlying dredge spoils during excavation.

Uncertainties in Visual Delineation of Dredge Spoils

Although visual delineation of dredge spoils is viable to support the potential removal action, uncertainties would be present particularly along the edges of the dredge spoil accumulations and adjacent to Rainey Creek. The characteristics of the downslope edge of the dredge spoils were observed on the east side of Rainey Creek. At this location, the surface layer of dredge spoils is only a few inches thick. It is likely that physical dispersion results in gradational contacts on the edges of major accumulations of dredge spoils, particularly on the downslope

edge. These areas would require careful observation and delineation during a potential removal action.

Riparian soils were observed along Rainey Creek in close proximity to known accumulations of dredge spoils. A discrete layer of dredge spoils was not observed in the riparian zone, although mica minerals including biotite and vermiculate are common within these soils. This suggests that erosion, reworking and deposition of dredge spoils along Rainy Creek have caused intermixing of riparian soils and dredge spoils directly adjacent to Rainey Creek. Removal of dredge spoils based on visual characteristics is not likely to be effective within these riparian soils. Common vermiculite was also observed within Rainy Creek sediments in this area. The extent to which this vermiculite is related to erosion of dredge spoils or other anthropogenic releases versus natural erosion of the vermiculite ore body over geological time cannot be determined based on evidence collected during the field visit.

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

PREPARED FOR AND WITH OVERSIGHT BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 8

SEPTEMBER 14, 2012

PREPARED BY:

MWH AMERICAS, INC.

2890 E. COTTONWOOD PARKWAY SUITE 300

SALT LAKE CITY, UTAH 84121

SAP/QAPP FOR OU3, LIBBY ASBESTOS SUPERFUND SITE

REMOVAL OF ASBESTOS-CONTAINING VERMICULITE WASTE NEAR THE "AMPHITHEATER" AT LIBBY ASBESTOS SUPERFUND SITE OU3

Revision Log:

Revision No.	Date	Description

Approvals:

The SAP/QAPP for Removal of Asbestos-Containing Vermiculite Waste near the "Amphitheater" at Libby Asbestos Superfund Site OU3 is approved for implementation without conditions.

Christina Progess
U.S. Environmental Protection Agency, Region 8
Remedial Project Manager and Quality Assurance Manager, Libby OU3

9/17/12
Date

John Garr
MWH, Project Manager

9-17-12
Date

Mike DeDen
MWH, Quality Assurance Coordinator

9/17/12
Date

DISTRIBUTION LIST

U.S. Environmental Protection Agency, Region VIII
1595 Wynkoop Street; 8EPR-SR
Denver, Colorado 80202-1129

- Victor Ketellapper (electronic copy)
- Christina Progess (2 hard copies, electronic copy)
- Elizabeth Fagen (electronic copy)
- Deborah McKean (electronic copy)
- David Berry (electronic copy)
- Dan Wall (electronic copy)
- Don Goodrich (electronic copy)
- Jeff Mosal (electronic copy)
- Dania Zinner (electronic copy)

Montana Department of Environmental Quality
1100 N Last Chance Gulch
Helena, Montana 59601

- John Podolinsky (1 hard copy; electronic copy)

CDM Smith – Libby
60 Port Boulevard, Suite 201
Libby, Montana 59923

- Thomas Cook (electronic copy)

Remedium Group, Inc.
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

- Robert Medler (1 hard copy; electronic copy)
- Robert Marriam (1 hard copy; electronic copy)

MWH Americas, Inc.
2890 E. Cottonwood Parkway, Suite 300
Salt Lake City, UT 84121

- John Garr (2 hard copies; electronic copy)

Materials Analytical Services, LLC
3945 Lakefield Ct.
Suwanee, GA 30024

- Michael Mount (electronic copy)

Techlaw, Inc.
ESAT, Region 8
16194 West 45th Drive
Golden, CO 80403

- Mark McDaniel (electronic copy)

HDR Engineering, Inc.
1715 South Reserve Street, Suite C
Missoula, MT 59801-4708

- Sean Everett (1 hard copy; electronic copy)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

**The most recent versions of field SOPs, FSDS forms, and COC forms are provided electronically in the OU3 eRoom (*https://team.cdm.com/eRoom/mt/LibbyOU3*). The most recent versions of laboratory and data verification SOPs are provided electronically in the Libby Lab eRoom (*https://team.cdm.com/eRoom/mt/LibbyLab*).

LIST OF ABBREVIATIONS AND ACRONYMS

Ago	area of a grid opening
AOC	Administrative Order on Consent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHISQ	chi-squared
CI	confidence interval
COC	chain-of-custody
DQO	data quality objective
ED	exposure duration
EDD	electronic data deliverable
EDS	energy dispersive spectroscopy
EF	exposure frequency
EPC	exposure point concentration
EPA	U.S. Environmental Protection Agency
ET	exposure time
F	fibers
f	indirect preparation dilution factor
FSDS	field sample data sheet
FTL	field team leader
GPS	global positioning system
GOx	number of grid openings examined
H&S	health and safety
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high-efficiency particulate air
HQ	hazard quotient
HV	high volume
ID	identification
IDW	investigation derived waste
ISO	International Organization for Standardization
KDC	Kootenai Development Corporation
L/cc	liters per cubic centimeter
LA	Libby amphibole
LC	laboratory coordinator
MCL	maximum contaminant level

MDEQ	Montana Department of Environmental Quality
mm	millimeter
MWH	MWH Americas, Inc.
N	number of asbestos structures counted
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NVLAP	National Voluntary Laboratory Accreditation Program
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
PCM	phase contrast microscopy
PCME	PCM-equivalent
PDF	portable document format
PE	performance evaluation
PLM	polarized light microscopy
PLM-VE	polarized light microscopy visual estimation
PLM-Grav	polarized light microscopy gravimetric
PPE	personal protective equipment
PRI-ER	Project Resources, Inc. - Environmental Restoration
QA	quality assurance
QAM	quality assurance manager
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
QATS	Quality Assurance Technical Support
QC	quality control
RBC	risk-based concentration
RfC	reference concentration
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROM	record of modification
RPM	remedial project manager
SAP	sampling and analysis plan
s/cc	structures per cubic centimeter
SOP	standard operating procedure
SPF	sample preparation facility
SRM	standard reference material
TAS	target analytical sensitivity

TWFc	cancer time weighting factor
TWFnc	non-cancer time weighting factor
µm	microns
USGS	United States Geological Survey
V	volume
%	percent
±	plus or minus
95UCL	95% upper confidence limit

SECTION 1 PROJECT OVERVIEW

1.1 PURPOSE OF THIS DOCUMENT

Part A of the *Work Plan for Removal of Asbestos-Containing Vermiculite Waste near the "Amphitheater" at the Libby Asbestos Superfund Site, OU3* (the Work Plan) covers site preparation, removal and disposal of wastes, characterization sampling and site restoration. Part B of the Work Plan (this document) contains the elements required for both a sampling and analysis plan (SAP) and quality assurance project plan (QAPP). This SAP/QAPP describes data collection efforts that will be conducted during removal of asbestos-containing vermiculite waste near the "Amphitheater" at Operable Unit 3 (OU3) of the Libby Asbestos Superfund Site (the Site).

This SAP/QAPP has been developed in basic accordance with the U.S. Environmental Protection Agency (EPA) *Requirements for Quality Assurance Project Plans, EPA QA/R-5* (EPA 2001) and the *Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G4* (EPA 2006). While this SAP/QAPP is organized differently than the recommended structure in the QA/R-5 guidance, all the required QAPP elements are presented. **Table 1-1** provides a cross-reference where information for each QA/R-5 element is located in this SAP/QAPP. This document is organized as follows:

Section 1 – Project Overview

Section 2 – Background and Problem Definition

Section 3 – Data Quality Objectives

Section 4 – Sampling Program

Section 5 – Sample Preparation and Analysis Requirements

Section 6 – Quality Assurance/Quality Control

Section 7 – Data Management

Section 8 – Assessment and Oversight

Section 9 – Data Validation and Usability

Section 10 – References

All cited tables, figures, and appendices are located at the end of this document, or are provided electronically in the Site eRooms. This SAP/QAPP has been adapted from the previously-issued SAP/QAPP for Phase V remedial investigation activities at OU3 (EPA 2012d).

1.2 PROJECT MANAGEMENT AND ORGANIZATION

Figure 1-1 presents an organizational chart that illustrates the lines of authority and communication between the agencies and contractors for this project. The following sections summarize the entities and individuals that will be responsible for providing project management, Work Plan development, field sampling support, on-site field coordination, laboratory support, data management, and quality assurance for this project.

1.2.1 Project Management

The EPA is the lead regulatory agency for Superfund activities within OU3. The EPA Remedial Project Manager (RPM) for OU3 is Christina Progess, 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 John Podolinsky. The EPA will consult with MDEQ as provided for by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan, and applicable guidance in conducting Superfund activities within OU3.

The EPA has entered into an Administrative Settlement Agreement and Order on Consent (AOC) with Respondents W.R. Grace & Co.-Conn. and Kootenai Development Corporation (collectively Grace) for the removal of asbestos-containing vermiculite waste near the "Amphitheater" at OU3 of the Libby Asbestos Site. Under the terms of the AOC, Grace will implement this Work Plan. The designated Project Coordinator for Grace is Robert Medler of Remedium Group, Inc. (Remedium). Remedium has chosen the following subcontractors to implement this Work Plan:

- MWH Americas, Inc. (MWH)
- Chapman Construction, Inc.

1.2.2 SAP/QAPP Development

This SAP/QAPP was developed by MWH Americas, Inc. (MWH) at the direction of Remedium and with oversight by the EPA. As noted, the copies of the entire Work Plan will be distributed by MWH (or their designee), either in hard copy or in electronic format, as indicated in the distribution list. MWH (or their designee) will distribute updated copies or addenda each time a Work Plan revision occurs. A copy of the final, signed Work Plan (and any subsequent revisions) will also be posted to the OU3 website[a] and the OU3 eRoom[b].

1.2.3 Field Sampling Support

All field sampling activities described in this SAP/QAPP will be performed by Grace, in strict accordance with the sampling plans contained herein. Grace will be supported in this field work by MWH and by their subcontractor Chapman Construction, Inc. Individuals responsible for implementation of field sampling activities in this SAP/QAPP are listed below:

- MWH Project Manager: John Garr
- MWH Field Team Leaders: Joan Kester/Bill Bragdon
- MWH Field Data Quality Control Officer: Betty Van Pelt

---

[a] http://cbec.srcinc.com/libby/
[b] https://team.cdm.com/eRoom/mt/LibbyOU3

- MWH Quality Control Officer: Mike DeDen

1.2.4 On-Site Field Coordination

Access to the mine and other areas of OU3 via Rainy Creek Road is currently restricted and is controlled by the EPA. The on-site point of contact for access to the mine is Rob Burton of Project Resources, Inc. - Environmental Restoration (PRI-ER):

Rob.burton@priworld.com

(406) 293-3690

1.2.5 Laboratory Support

Soil characterization samples for asbestos analysis will be prepared (dried, sieved, ground) at the Sample Preparation Facility (SPF) in Troy, Montana. The SPF is managed by the EPA Environmental Services Assistance Team contractor, TechLaw, Inc. After preparation, the samples will be shipped to Materials Analytical Services, LLC (MAS) in Suwanee, Georgia for LA analysis by polarized light microscopy (PLM) using visual area estimation (PLM-VE) according to the Libby-specific analysis methods.

1.2.6 Data Management

Administration of the master database for OU3 will be performed by EPA contractors. The primary database administrator will be Lynn Woodbury (CDM Smith). The database administrator (or their designee) will be responsible for sample tracking, uploading new data, performing data verification and error checks to identify incorrect, inconsistent or missing data, and ensuring that all questionable data are checked and corrected as needed. When the OU3 database has been populated, checked, and validated, relevant asbestos data will be transferred into a Libby Asbestos Site database as directed by the EPA for final storage.

1.2.7 Quality Assurance

There is no individual designated as the EPA Quality Assurance Manager for the Libby project. Rather, the Region 8 quality assurance (QA) program has delegated authority to the EPA RPMs. This means that the EPA RPMs have the ability to review and approve governing investigation documents developed by Site contractors. Thus, it is the responsibility of the EPA RPM for OU3, who is independent of the entities planning and obtaining the data, to ensure that this SAP/QAPP has been prepared in accordance with the EPA QA guidelines and requirements. The EPA RPM is also responsible for managing and overseeing all aspects of the quality assurance/quality control (QA/QC) program for OU3. In this regard, the EPA RPM is supported by the EPA Quality Assurance Technical Support (QATS) contractor, Shaw Environmental, Inc. (Shaw). The QATS contractor will evaluate and monitor QA/QC sampling and is responsible for performing annual audits of each analytical laboratory. In addition, HDR Engineering, Inc. has been contracted by the EPA to provide oversight of field sampling and data collection activities.

SECTION 2 BACKGROUND AND PROBLEM FORMULATION

2.1 SITE DESCRIPTION

Libby is a community in northwestern Montana that is located near a large open-pit vermiculite mine. Vermiculite from the mine at Libby is known to contain amphibole asbestos that includes several different mineralogical classifications. For the purposes of the EPA investigations at the Libby Asbestos Superfund Site, this mixture is referred to as Libby amphibole (LA).

Historic mining, milling, and processing of vermiculite at the site are known to have caused releases of vermiculite and LA to the environment. Inhalation of LA associated with the vermiculite is known to have caused a range of adverse health effects in exposed humans, including workers at the mine and processing facilities (Amandus and Wheeler 1987, McDonald *et al.* 1986, McDonald *et al.* 2004, Sullivan 2007, Rohs *et al.* 2007), as well as some residents of Libby (Peipins *et al.* 2003). Based on these adverse effects, the EPA listed the Libby Asbestos Site on the National Priorities List in October 2002.

Starting in 2000, the EPA began conducting a range of cleanup actions at the site to eliminate sources of LA exposure to area residents and workers using CERCLA (or Superfund) authority. Given the size and complexity of the Libby Asbestos Site, the EPA designated a number of OUs. This document focuses on investigations at OU3. OU3 includes the property in and around the former vermiculite mine and the forested areas surrounding the mine that have been affected by releases and subsequent migration of hazardous substances and/or pollutants or contaminants from the mine, including ponds, Rainy Creek, Carney Creek, Fleetwood Creek, and the Kootenai River. Rainy Creek Road is also included in OU3.

Figure 2-1 shows the location of the mine and a preliminary study area boundary for OU3. The EPA established the preliminary study area boundary for the purpose of planning and developing the scope of the 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.

2.2 BASIS FOR CONCERN AT OU3

The EPA is concerned with environmental contamination in OU3 because the area is used by humans for a variety of recreational and occupational activities, and also because the area is habitat for a wide range of ecological receptors (both aquatic and terrestrial).

2.3 SCOPE AND STRATEGY OF THE REMOVAL OF ASBESTOS-CONTAINING VERMICULITE WASTE NEAR THE "AMPHITHEATER" AT LIBBY ASBESTOS SUPERFUND SITE OU3

Grace will perform a removal action in OU3 under EPA oversight to remove recently-discovered asbestos-containing vermiculite waste below the "Amphitheater" and in the vicinity of a portion of Rainy Creek (see **Figure 3-2**).

The removal action will be performed in a single phase of work, contingent on timing of approvals for project documents and as weather permits. The removal action is expected to be complete within 60 to 90 days of notice to proceed.

2.4 SUMMARY OF EXISTING DATA

While considering various alignments for re-routing Rainy Creek as part of a preliminary evaluation of potential site remediation scenarios, asbestos-containing vermiculite waste was discovered in October 2011 south of the "Amphitheater" at OU3. The Amphitheater is a portion of the site used by EPA for staging soil removed from OU4 (the town of Libby) before it is transported to the top of the former mine for disposal.

As discovered during subsequent investigation in October 2011, the size of the waste material ranges up to 7 mm in diameter and is covered by vegetation. The material is present over approximately five acres below the Amphitheater, north and south of the Rainy Creek channel. Based on a few widely-spaced shovel-dug potholes, the estimated average thickness of the vermiculite is about 12 inches. Assuming these estimates, the volume of the vermiculite waste material is about 8,100 cubic yards.

The waste-covered area is outside the naturally-occurring vermiculite mine deposit and it is obvious the material has been crushed and screened. The material is purported to be sediments dredged from the bottom of nearby Mill Pond (see **Figure 3-2**) that were periodically spread out on the area below the current Amphitheater area.

Laboratory analysis (by PLM in accordance with National Institute of Occupational Safety and Health [NIOSH] Method 9002, Issue 2) of three grab samples of the vermiculite waste revealed it contains 3% to 4 % LA. Analysis was performed by EMSL Analytical, Inc. in Libby. Sample chain-of-custody and laboratory analytical reports are in Attachment 1 of Part A of the Work Plan for Removal of Asbestos-Containing Vermiculite Waste near the "Amphitheater" at Libby Asbestos Superfund Site OU3.

Further investigation of the nature, thickness, and extent of the vermiculite waste was performed in July 2012. A tire-mounted backhoe was used to excavate 19 test pits across the affected area. Two basic types of waste were found in the test pits: a coarse-grained, greenish-black material (primarily located north of Rainy Creek), and a fine, powdery bronze material most prevalent south of Rainy Creek. Waste thickness ranges from less than one inch near the margins to more than 3 feet in berms and piles on the area south of Rainy Creek.

SECTION 3 DATA QUALITY OBJECTIVES

3.1 OVERVIEW OF THE PROCESS

Data quality objectives (DQOs) define the type, quality, quantity, purpose, and intended uses of data to be collected (EPA 2006). The design of a study is closely tied to its DQOs, which serve as the basis for important decisions regarding key design features such as the number and location of samples to be collected and the analyses to be performed. In brief, the DQO process typically follows a seven-step procedure, as follows:

1. State the problem that the study is designed to address
2. Identify the decisions to be made with the data obtained
3. Identify the types of data inputs needed to make the decision
4. Define the bounds (in space and time) of the study
5. Define the decision rule which will be used to make decisions
6. Define the acceptable limits on decision errors
7. Optimize the design using information identified in Steps 1-6

Following these seven steps helps ensure that the project plan is carefully thought out and that the data collected will provide sufficient information to support the key decisions which must be made.

3.2 DATA QUALITY OBJECTIVES FOR SAMPLE COLLECTION

3.2.1 State the Problem

Vermiculite is spread across approximately 5 acres of flat canyon floor immediately south of the Amphitheater. Because the vermiculite waste contains LA, it is possible the material may enter Rainy Creek (which bisects the waste-covered area) and increase the concentration of LA in lower Rainy Creek water. Because there are no current controls in-place to contain the waste material and prevent its transport through erosion or wind, removal of the vermiculite waste will eliminate this potential source of LA contamination in lower Rainy Creek. Data are needed to document the nature and extent of post-removal LA concentrations in the soil beneath the vermiculite waste after removal has been completed.

3.2.2 Identify the Goal of the Removal Action

The goal of the removal action is to remove the vermiculite waste from the defined work area and to restore the area such that drainage and erosion are controlled by topography and vegetation. Removal of the vermiculite waste will eliminate a potential ongoing source of LA contamination to lower Rainy Creek; the removal and site restoration will also protect Rainy Creek from uncontrolled erosion and siltation and will thus improve and protect the environmental quality of the creek. The goal of this sampling effort is to provide data on LA concentrations in soil following the removal effort to document the levels of LA that may remain in soils post-removal.

3.2.3 Identify the Types of Data Needed

Soil Data

Reliable and representative measurements of LA concentrations are needed to document post-removal LA concentrations in the underlying soil beneath the vermiculite waste.

Target Analyte

Samples of underlying soil will be collected after waste removal and will be analyzed for LA using PLM according to the Libby-specific analytical SOPs, under standard turn-around time.

3.2.4 Define the Bounds of the Removal Action

Spatial Bounds

Figure 1 of the Work Plan, Part A depicts the estimated bounds of the removal action which was determined based on field observation and examination of test pits. The boundaries may change based on field findings during waste removal. The work will be completed in 30-60 days.

3.2.5 Define the Analytic Approach

Reliable and representative measurements of LA concentrations are needed to document post-removal LA concentrations in the underlying soil beneath the vermiculite waste. Because the contrasting characteristics of the vermiculite waste and the underlying soil are obvious and clear guides to waste removal, the results will not be used as confirmation samples. Rather, the characterization samples will document the LA concentration in the underlying soil, if any.

3.2.6 Define the Acceptable Limits on Decision Errors

No acceptable limits on decision errors is necessary because the concentrations of LA in underlying soil at the waste removal site are for characterization and documentation only and will not be used for decision-making. Sample collection will be one 30-point composite sample per gridded cell of approximately 15,000 sq. ft.

3.2.7 Optimize the Design

Sampling design considerations needed to optimize the characterization of LA concentrations in underlying soil at the waste removal site are provided in Section 4.

SECTION 4 SAMPLING PROGRAM

Soil collection activities within OU3 described in this SAP/QAPP will be performed by personnel who are properly trained in the field methods and the experimental sampling design details presented below. The field sampling teams will follow procedures in the OU3-specific Health and Safety Plan (HASP) prepared by MWH.

4.1 SOIL SAMPLING STUDY DESIGN

4.1.1 Sampling Locations

Once the removal action has been completed, the area will be gridded into cells approximately 125 feet square (15,625 square feet; about one-third of an acre). Soil characterization samples will be 30-point composites collected at approximately equidistant from each other and representative of each cell.

4.1.2 Sampling Frequency

One 30-point composite characterization soil sample will be collected from each of approximately 15 cells.

4.1.3 Study Variables

Levels of LA in soil will likely vary across the area of underlying soil that is exposed. Soil samples will be collected as 30-point composite samples to ensure that the soil results will account for spatial variability in LA concentrations in the cells.

4.1.4 Critical Measurements

A critical measurement associated with this project is the measurement of the concentration of LA in soil, as determined by the Libby-specific PLM methods. In addition, at the Site, the visual presence of vermiculite has been shown to be an effective tool for determining the presence of LA in soil. Thus, visual estimates of vermiculite content of soil will be performed using Libby-specific SOP CDM-LIBBY-06.

A memorandum by Mark Nelson, P.G. from CDM, summarizes his field observations of test pits in the waste area on August 8, 2012 and describes the contrast between waste material and underlying soil which will be used to delineate the depth to which the excavation will extend. Photo documentation of this boundary will be provided.

4.1.5 Data Reduction and Interpretation

LA concentrations in soil samples collected as part of the removal action will be used to document the underlying soil conditions in the area beneath the waste and serve as final bounds of the removal. As-built maps will be provided showing concentrations and locations where samples were taken. Maps will include actual lateral extent of excavation.

4.2 SOIL SAMPLE COLLECTION METHODS

Soil samples will be 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* (see **Appendix A**), with the following project-specific modifications:

- It is recognized that this SOP is for soil sampling, but the basic sampling methods are applicable to the collection of exposed soils.
- Each composite soil sample will comprise 30 individual sampling points that are approximately equidistant from each other and representative of the 15,000 sq. ft. cell.
- At each sampling point, collect approximately 50 grams of material. The total mass of soil material for the composite sample should fill about 1/3 of a gallon-sized zip-top bag.
- The amount of visible vermiculite at each of the 30 sub-locations should be recorded on the field sample data sheet (FSDS) form by field sampling personnel using the principles outlined in SOP CDM-LIBBY-06, *Semi-Quantitative Visual Estimation of Vermiculite in Soils at Residential and Commercial Properties* (see **Appendix A)**. Visible vermiculite will be noted as a presence or absence (number of visible inspection points with vermiculite present and the number of visible inspection points without vermiculite) rather than as the number of points with low, medium, and high amounts of vermiculite in each inspection point as required by SOP CDM-LIBBY-06.

4.3 GLOBAL POSITIONING SYSTEM COORDINATE COLLECTION

The global positioning system (GPS) coordinates will be recorded for each sampling station/cell center point in basic accordance with the procedures specified in OU3-specific SOP No. 11, *GPS Data Collection* (see **Appendix A**). If necessary, any changes in existing sampling stations should be documented in the field logbook and new GPS coordinates should recorded. If any sampling stations become inaccessible, this information should be documented in the field logbook.

4.4 EQUIPMENT DECONTAMINATION

Dedicated sampling equipment will be used to collect the soil characterization samples, thus, no decontamination will be required. Spent sampling equipment will be disposed as investigation-derived waste (IDW).

4.5 HANDLING INVESTIGATION-DERIVED WASTE

Any disposable equipment or other IDW will be handled in basic accordance with the procedures specified in OU3-specific SOP No. 12, *IDW Management* (see **Appendix A**).

4.6 INVENTORY AND PROCUREMENT OF EQUIPMENT AND SUPPLIES

Prior to initiation of any sampling activities, it is the responsibility of the field team leader (FTL) to review the respective SOPs (see **Appendix A**) and determine the equipment and supplies that

are necessary to conduct sampling activities. The FTL will check the field equipment/supply inventory and procure any additional equipment and supplies that are not already contained in the field equipment supply inventory.

The following list summarizes the general equipment and supplies that will be required for most of the studies:

- *Sampling equipment* – See Section 4.4 for sample collection SOPs and sampling equipment lists.
- *Field logbook* – Used to document field sampling activities and any problems in sample collection or deviations from this SAP/QAPP. See Section 4.7.1 for standard procedures for field logbooks.
- *Field sample data sheets (FSDSs)* – FSDSs are medium-specific forms that are used to document sample details (i.e., sampling location, sample number, medium, field QC type, etc.). See Section 4.7.1 for standard procedures for the completion of FSDSs. Libby Soil-Like Sample & Location FSDS will be used.
- *Sample number labels*– Sample numbers are sequential numbers with investigation-specific prefixes. Sample number labels are pre-printed and checked out to the field teams by the FTL (or their designee). To avoid potential transcription errors in the field, multiple labels of the same sample number are prepared – one label is affixed to the collected sample, one label is affixed to the FSDS. Labels may also be affixed to the field logbook or other field documentation forms. See Section 4.7.1 for standard procedures for the completion of FSDSs.
- *Indelible ink pen, permanent marker* – Indelible ink pens are used to complete required manual data entry of information on the FSDS and in the field logbook (pencil may not be used). Permanent markers may be used to write sample numbers on the sample container if pre-printed labels are not available.
- *Personal protective equipment (PPE)* - As required by the HASP.
- *Digital camera* – Used to document sampling locations and conditions.
- *Global positioning system (GPS) unit, measuring wheel, stakes* – Used to identify and mark sampling locations. See Section 4.3 for standard procedures in GPS documentation.

4.7 SAMPLE HANDLING AND CUSTODY

4.7.1 Sample Identification and Documentation

Sample Labels

Samples will be labeled with sample identification (ID) numbers supplied by field administrative staff and will be signed out by the sampling teams. Labels will be affixed on the outside of both the inner and outer zip-top bags for soil samples.

Sample ID numbers will identify the samples collected during this sampling investigation using the following format:

VW-1####

where:

VW-1 = Prefix that designates samples collected under this Vermiculite Waste Removal Action

= A sequential four-digit number

Field Documentation

Field teams will record sample information on the most current version of the OU3-specific field sample data sheet (FSDS) for each collected soil sample (see **Appendix C**) in accordance with the procedures specified in OU3-specific SOP No. 9, *Field Documentation* (see **Appendix A**).

The field logbook is an accounting of activities at the Site and will duly note problems or deviations from the governing SAP/QAPP or SOPs. Separate field logbooks will be kept for each study and the cover of each field logbook will clearly indicate the name of the associated study. Field logbooks will be completed prior to leaving a sampling location. Field logbooks will be checked for completeness on a daily basis by the FTL (or their designee) for the first week of each study. When incorrect field logbook completion procedures are discovered during these checks, the errors will be discussed with the author of the entry and corrected. Erroneous information recorded in a field logbook will be corrected with a single line strikeout, initial, and date. The correct information will be entered in close proximity to the erroneous entry.

4.7.2 Field Sample Custody

Field sample custody will follow the requirements specified in OU3-specific SOP No. 9 (see **Appendix A**). In brief, all teams will ensure that samples, while in their possession, are maintained in a secure manner to prevent tampering, damage, or loss. All samples and FSDSs will be relinquished by field staff to the field sample coordinator or a designated secure sample storage location at the end of each day.

4.7.3 Chain-of-Custody Requirements

The chain-of-custody (COC) record is employed as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A completed COC record is required to accompany each shipment of samples. Sample custody will be maintained until final disposition of the samples by the laboratory and acceptance of analytical results by the EPA.

The field sample coordinator will prepare a hard copy COC form using the 3-page carbon copy forms developed specifically for use in this investigation (see **Appendix D**). The bottom copy of the COC will be retained by the field sample coordinator and the other two copies of the COC will accompany the sample shipment.

If any errors are found on a COC after shipment, the hard copy of the COC retained by the field sample coordinator will be corrected and a corrected COC will be provided to the laboratory coordinator (LC) for distribution to the appropriate laboratory.

4.7.4 Sample Packaging and Shipping

Samples will be packaged and shipped in basic accordance with the procedures specified in OU3-specific SOP No. 8, *Sample Handling and Shipping* (see **Appendix A**). In brief, samples

will be hand-delivered to the facility or laboratory, picked up by a delivery service courier, or shipped by a delivery service to the designated facility or laboratory, as applicable. For samples requiring shipment, prior to sealing the shipping container, the field sample coordinator will complete the bottom of the COC record and retain the bottom copy of the COC record for the project record. The LC will instruct the field sample coordinator as to the appropriate laboratory for each sample shipment.

4.7.5 Holding Times

In general, there are no holding time requirements for asbestos and the soil characterization samples will not require special preservation prior to delivery to the laboratory.

SECTION 5 SAMPLE PREPARATION AND ANALYSIS REQUIREMENTS

5.1 SOIL METHODS AND REQUIREMENTS

5.1.1 Sample Preparation

All soil samples collected for asbestos analysis will be transmitted to the SPF located in Troy, MT. Samples will be prepared in accordance with Libby-specific SOP ISSI-LIBBY-01. In brief, the raw soil sample is dried and then split into two aliquots. One aliquot is placed into archive, and the other aliquot is sieved into coarse (> ¼ inch) and fine fractions. The fine fraction is ground to reduce particles to a diameter of 250 µm or less and this fine-ground portion is split into 4 aliquots.

5.1.2 Sample Analysis

Each soil sample will be analyzed for LA in accordance with Libby-specific SOPs. The coarse fraction (if any) will be examined using stereomicroscopy, and any particles of LA will be removed and weighed in accordance with SOP SRC-LIBBY-01, referred to as "PLM-Grav". One of the fine ground fraction aliquots will be analyzed by PLM using the visual estimation method in accordance with SOP SRC-LIBBY-03, referred to as "PLM-VE". Mass fraction estimates of LA and optical property details will be recorded on the Libby site-specific laboratory bench sheets and electronic data deliverable (EDD) spreadsheets.

5.2 DATA REPORTING

5.2.1 Soil Preparation Facility

Samples will be prepared at the Troy SPF. At the SPF, a local SPF Scribe database is used to track specific information associated with the soil sample preparation process. SPF personnel perform data entry of preparation information from the sample drying and preparation log sheets into an Excel spreadsheet. Preparation data are then uploaded from this spreadsheet into the local SPF Scribe database. Soil sample preparation information will be published to Scribe.NET regularly from the local SPF Scribe project database by the SPF sample coordinator.

5.2.2 Analytical Laboratories

Analytical results will be recorded and results transmitted using the Libby-specific EDD spreadsheets for PLM-VE and PLM-Grav results. Standard project data reporting requirements will be met for this dataset. Upon completion of the appropriate analyses, EDDs will be posted to the Libby OU3 eRoom within the appropriate turn-around time. Hard copies of all analytical laboratory data packages will be scanned and posted as a portable document format (PDF) to the Libby OU3 eRoom. File names for scanned analytical laboratory data packages will include the laboratory name and the job number to facilitate document organization (e.g., LabX_12345-A.pdf).

5.3 ANALYTICAL TURNAROUND TIME

Analytical turnaround time will be negotiated between the LC and the laboratory, with direction from the EPA RPM. It is anticipated that a turnaround time of 2-3 weeks is acceptable for most samples. This may be revised as determined necessary by the EPA.

5.4 CUSTODY PROCEDURES

5.4.1 Soil Preparation Facility

Samples will be prepared at the Troy SPF. At the SPF, the local SPF Scribe project database is used by the SPF sample coordinator or the ESAT project data manager to prepare an electronic COC. One hard copy of the COC will be generated from the electronic COC and will accompany the sample shipment. The SPF sample coordinator will note the analytical priority level for the samples (based on consultation with the LC) at the top of the COC. The SPF will sign and date the COC and make a copy for the SPF project file. Information on the COC number and analytical laboratory to which the soil samples were shipped is managed in a spreadsheet maintained by the SPF sample coordinator (or their designee). A copy of this spreadsheet is posted regularly to the Libby Laboratory eRoom.

If any errors are found on a COC after shipment to the analytical laboratory, the hard copy of the COC retained by the SPF sample coordinator will be corrected with a single strikeout, initial, and date. A copy of the corrected COC will be provided to the LC for distribution to the appropriate laboratory. It is the responsibility of the SPF sample coordinator to make any corrections to the local SPF Scribe project database and publish the corrected data to Scribe.NET.

5.4.2 Analytical Laboratories

Specific laboratory custody procedures are provided in each laboratory's *Quality Assurance Management Plan*, which have been independently reviewed at the time of laboratory procurement. While specific laboratory sample custody procedures may differ between laboratories, the basic laboratory sample custody process is described briefly below.

Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipment and the individual samples. This inspection will include verifying sample integrity. The accompanying COC record will be cross-referenced with all of the samples in the shipment. The laboratory sample coordinator will sign the COC record, email a copy of the final signed COC to the SPF sample coordinator and the appropriate project data manager, and maintain a copy for their project files.

Depending upon the laboratory-specific tracking procedures, the laboratory sample coordinator may assign a unique laboratory identification number to each sample on the COC. This number, if assigned, will identify the sample through all further handling at the laboratory. It is the responsibility of the laboratory manager to ensure that internal logbooks and records are maintained throughout sample preparation, analysis, and data reporting.

5.5 ARCHIVING AND FINAL DISPOSITION

All samples and grids will be maintained in storage at the analytical laboratory unless otherwise directed by the EPA. When authorized by the EPA, the laboratory will be responsible for proper disposal of any remaining samples, sample containers, shipping containers, and packing materials in accordance with sound environmental practice, based on the sample analytical results. The laboratory will maintain proper records of waste disposal methods, and will have disposal company contracts on file for inspection.

SECTION 6 QUALITY ASSURANCE/QUALITY CONTROL

6.1 FIELD

Field quality assurance/quality control (QA/QC) activities include all processes and procedures that have been designed to ensure that field samples are collected and documented properly, and that any issues/deficiencies associated with field data collection or sample processing are quickly identified and rectified. The following sections describe each of the components of the field QA/QC program implemented at the Site.

6.1.1 Field Team Training

Asbestos is a hazardous substance that can increase the risk of cancer and serious non-cancer effects in people who are exposed by inhalation. Therefore, all individuals involved in the collection, packaging, and shipment of samples must have appropriate training. Prior to starting any field work, any new field team member must complete the following, at a minimum:

Training Requirement	Location of Documentation Specifying Training Requirement Completion
Read and understand the governing Health and Safety Plan (HASP)	HASP signature sheet
Attend an orientation session with the field Health and Safety (H&S) manager	Orientation session attendance sheet
Occupational Safety and Health Administration (OSHA) 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and relevant 8-hour refreshers	OSHA training certificates
Current 40-hour HAZWOPER medical clearance	Physician letter in the field personnel files
Respiratory protection training, as required by 29 CFR 1910.134	Training certificate
Asbestos awareness training, as required by 29 CFR 1910.1001	Training certificate
Sample collection techniques	Orientation session attendance sheet

It is the responsibility of the field H&S manager to ensure that all training documentation is up-to-date and on-file for each field team member.

A field readiness review meeting will be conducted prior to beginning field sampling activities, to discuss and clarify the following:

- Objectives and scope of the fieldwork
- Equipment and training needs

- Field operating procedures, schedules of events, and individual assignments
- Required QC measures
- Health and safety requirements

It is the responsibility of each field team member to review and understand all applicable governing documents associated with this sampling program, including this SAP/QAPP, all associated SOPs (see **Appendix A**), and the applicable HASP. The FTL will oversee all sample collection activities to ensure that governing documents are implemented appropriately.

6.1.2 Modification Documentation

Minor deviations (i.e., those that will not impact data quality or usability) encountered in day-to-day field work will be noted in the field logbook. Major deviations from this SAP/QAPP that modify the sampling approach and associated guidance documents will be recorded on a field record of modification (ROM) form (see **Appendix B**). Field ROMs will be completed by the FTL, or by assigned field or technical staff. Each completed ROM is assigned a unique number that is specific to each investigation (e.g., VWR-OU3-01) by the EPA RPM or their delegate. Once a form is prepared, it is submitted to the EPA RPM for review and approval. Copies of approved field ROMs are available in the OU3 eRoom and are posted to the OU3 website.

6.1.3 Field Quality Control Samples

Field-based QC samples are those samples which are prepared in the field and submitted to the laboratory in a blind fashion. That is, the laboratory is not aware the sample is a QC sample, and should be treated in the same way as a field sample.

Soil

Field duplicate samples will be collected as part of the soil sampling for this investigation. Field duplicates for soil are collected from the same area as the parent sample but from different individual sampling points. These samples are collected independent of the original field sample with separate sampling equipment and submitted for analysis along with the collected field samples. The field duplicate contains the same number of subsamples as the parent sample (i.e., if the parent sample is a 30-point composite, the field duplicate sample is also a 30-point composite).

Soil field duplicate samples will be collected at a rate of 1 field duplicate per 10 field samples (10%). It is the responsibility of the FTL to ensure that the appropriate number of field duplicates is collected. Each field duplicate is given a unique sample number, and field personnel record the sample number of the associated co-located sample in the parent sample number field of the FSDS. The same station location is assigned to the field duplicate sample as the parent field sample. Field duplicates will be sent for analysis by the same method as field samples and are blind to the laboratories (i.e., the laboratory cannot distinguish between field samples and field duplicates).

Field duplicate results analyzed by PLM will be considered concordant if the reported semi-quantitative bin result for the field duplicate is within one bin of the original parent field sample. The variability between the field duplicate and the associated parent field sample reflects the combined variation in sample heterogeneity and the variation due to measurement error. Because

field duplicate samples are expected to have inherent variability that is random and may be either small or large, typically, there is no quantitative requirement for the agreement of field duplicates. Rather, results are used to determine the magnitude of this variability to evaluate data usability. In general, if the concordance rate for field duplicate samples is less than 20% for the investigation, the data usability assessment should alert data users to this inherent variability.

Equipment Rinsates

Because only dedicated sampling equipment will be used to collect soil characterization samples during the removal action, no equipment rinsate samples will be collected or analyzed.

6.2 PREPARATION FACILITY

All soil samples submitted for analysis by the Libby-specific PLM methods (i.e., PLM-Grav and PLM-VE) are first processed in accordance with SOP ISSI-LIBBY-01. This processing includes drying, splitting, sieving, grinding, and archiving. These sample processing activities will be completed at the SPF located in Troy, Montana, referred to as the "Troy SPF".

The QA/QC of the soil preparation process is maintained by adherence to standard preparation procedures, submission of preparation QC samples, facilities monitoring, and audits. These procedures and requirements are summarized below. Detailed information regarding soil preparation procedures and requirements for the Troy SPF can be found in SOP ISSI-LIBBY-01, the *Soil Sample Preparation Work Plan*, and the *ESAT Site Safety Plan*.

6.2.1 Training and Personnel Requirements

Personnel performing sample preparation activities must have read and understood the *Soil Sample Preparation Work Plan*, the SPF HASP, and all associated SOPs and governing documents for soil preparation (e.g., SOP ISSI-LIBBY-01). In addition, all personnel must have completed 40-hour OSHA HAZWOPER training, annual updates, annual respirator fit tests, and annual or semi-annual physicals, as required.

Prior to performing activities at the Troy SPF, new personnel will be instructed by an experienced member of the SPF staff and training sessions will be documented in the SPF project files. It is the responsibility of the SPF quality assurance manager (QAM) to ensure that all personnel have completed the required training requirements.

6.2.2 Modification Documentation

When changes or revisions are needed to improve or document specifics about sample preparation procedures used by the Troy SPF, these changes are documented using a laboratory ROM form (see **Appendix B**). The SPF ROM form provides a standardized format for tracking procedural changes in sample preparation and allows project managers to assess potential impacts on the quality of the data being collected. SPF ROMs will be completed by the appropriate SPF or technical staff. Once a form is prepared, it is submitted to the ESAT QAM (or their designee) for review. Final review and approval is provided by the appropriate EPA RPM. Copies of approved SPF ROMs are available in the Libby Laboratory eRoom.

6.2.3 Preparation QC Samples

Four types of preparation QC samples are collected during the soil preparation process: sand blanks, drying blanks, grinding blanks, and preparation duplicates. Each type of preparation QC sample is described in more detail below.

Sand Blank

A sand blank is a sample of store-bought quartz sand that is analyzed to ensure that the quartz sand matrix used for drying and grinding blanks is asbestos-free. Detailed procedures for this certification process are provided in ESAT SOP PLM-02.00, *Blank Sand Certification by Polarized Light Microscopy*. In brief, for each bag of sand, about 800 grams of sand are removed and split into 40 sand blank aliquots of roughly equal size. Each sand blank is evaluated using stereomicroscopic examination and analyzed by PLM-VE. If a sand blank has detected asbestos, it is re-analyzed by a second PLM analyst to verify the presence of asbestos. The sand is certified as asbestos-free if all 40 sand blanks are non-detect for asbestos. The entire bag of sand is rejected for use if any asbestos is detected in the sand blanks. Only sand bags that are certified as asbestos-free will be utilized in the SPF.

Drying Blank

A drying blank consists of approximately 100 to 200 grams of asbestos-free quartz sand that is processed with each batch of field samples that are dried together (usually this is approximately 125 samples per batch). The drying blank is then processed identically to field samples. Drying blanks determine if cross-contamination between samples is occurring during sample drying. One drying blank will be processed with each drying batch per oven. It is the responsibility of the SPF QAM to ensure that the appropriate number of drying blanks is collected. Each drying blank is given a unique sample number that is investigation-specific, as provided by the field sample coordinator (i.e., a subset of sample numbers for each investigation will be provided for use by the SPF). SPF personnel will record the sample number of the drying blank on the sample drying log sheet.

It is the responsibility of the QATS contractor to review the drying blank results and notify the SPF QAM immediately if drying blank results do not meet acceptance criteria and if corrective actions are necessary. If asbestos is detected by PLM-VE in the drying blank (i.e., result is not Bin A), a qualifier of "DB" will be added to the related field sample results in the project database that were dried at the same time as the detected drying blank to denote that the associated drying blank had detected asbestos. In addition, the drying oven will be thoroughly cleaned. If asbestos continues to be detected in drying blanks after cleaning occurs, sample processing must stop and the drying method and decontamination procedures will be evaluated to rectify any cross-contamination issues.

Grinding Blank

A grinding blank consists of asbestos-free quartz sand and is processed along with the field samples on days that field samples are ground. Grinding blanks determine if decontamination procedures of laboratory soil processing equipment used for sample grinding and splitting are adequate to prevent cross-contamination. Grinding blanks are prepared at a frequency of one per grinding batch per grinder per day. It is the responsibility of the SPF QAM to ensure that the appropriate number of grinding blanks is collected. Each grinding blank is given a unique sample

number that is investigation-specific, as provided by the field sample coordinator. SPF personnel will record the sample number of the grinding blank on the sample preparation log sheet.

It is the responsibility of the QATS contractor to review the grinding blank results and notify the SPF QAM immediately if drying blank results do not meet acceptance criteria and if corrective actions are necessary. If any asbestos is detected by PLM-VE in the grinding blank (i.e., result is not Bin A), a qualifier of "GB" will be added to the related field sample results in the project database that were ground at the same time as the detected grinding blank to denote that the associated grinding blank had detected asbestos. In addition, the grinder will be thoroughly cleaned. If asbestos continues to be detected in grinding blanks after cleaning occurs, sample processing must stop and the grinding method and decontamination procedures will be evaluated to rectify any cross-contamination issues.

Preparation Duplicate

Preparation duplicates are splits of field samples submitted for sample preparation. The preparation duplicates are used to evaluate the variability that arises during the soil preparation and analysis steps. After drying, but prior to sieving, a preparation duplicate is prepared by using a riffle splitter to divide the field sample (after an archive split has been created) into two approximately equal portions, creating a parent and duplicate sample.

Preparation duplicate samples are prepared at a rate of 1 per 20 samples (5%) of samples prepared. It is the responsibility of the SPF QAM to ensure that the appropriate number of preparation duplicates is prepared. Each preparation duplicate is given a unique sample number that is investigation-specific, as provided by the field sample coordinator. SPF personnel will record the sample number of the preparation duplicate and its associated parent field sample on the sample preparation log sheet. Preparation duplicates are submitted blind to the laboratory for analysis by the same analytical method as the parent sample.

Preparation duplicate results will be considered concordant if the reported PLM bin for the preparation duplicate is within one bin of the original parent field sample. The variability between the preparation duplicate and the associated field sample reflects the combined variation due to sample preparation and due to measurement error. Results for preparation duplicate samples are evaluated by the QATS contractor (or their designee). If the concordance rate for preparation duplicate samples is less than 10%, the QATS contractor will notify the SPF QAM to determine if corrective action is needed.

6.2.4 Performance Evaluation Standards

The USGS has prepared several Site-specific reference materials for LA in soil that are utilized as performance evaluation (PE) standards to evaluate PLM-VE laboratory accuracy and precision. These PE standards are kept in storage at the Troy SPF and are inserted into the sample train during soil sample processing. In accordance with SOP ISSI-LIBBY-01, PE standards are inserted both pre- and post-processing. PE standards of varying nominal levels will be inserted at a rate of at least one per month per PLM laboratory when soil processing is occurring.

It is the responsibility of the SPF QAM to ensure that the appropriate number of PE standards is inserted. Each PE standard is given a unique sample number that is investigation-specific, as provided by the field sample coordinator. SPF personnel will record the sample number of the

PE standard, the nominal level of the PE standard, and whether it was inserted pre- or post-processing on the sample preparation log sheet. PE standards are submitted blind to the laboratory for analysis by the same analytical method as the field samples.

Results for PE standards will be evaluated by the QATS contractor (or their designee). PE standard results are ranked as acceptable if the correct semi-quantitative bin is reported, as determined by the nominal concentration of the PE standard. The LC should be notified if PE standard results do not meet acceptance criteria. Corrective action will be taken if the PE standards demonstrate issues with accuracy and/or bias in PLM-VE results reporting. Examples of corrective actions that may be taken include reanalysis and/or re-preparation, collaboration between and among laboratories to address potential differences in analysis methods, and analyst re-training.

6.3 ANALYTICAL LABORATORY

Laboratories selected for analysis of samples for asbestos are part of the Libby analytical team. These laboratories have all demonstrated experience and expertise in analysis of LA in environmental media, and all are part of an on-going site-specific QA program designed to ensure accuracy of analytical and consistency of reported analytical results between laboratories. These laboratories are audited by the EPA QATS contractor (see Section 8.1.2) and the National Voluntary Laboratory Accreditation Program (NVLAP) on a regular basis.

Laboratory QA/QC activities include all processes and procedures that have been designed to ensure that data generated by an analytical laboratory are of high quality and that any problems in sample preparation or analysis that may occur are quickly identified and rectified. Laboratories handling samples collected as part of this sampling investigation will be provided a copy of and will adhere to the requirements of this SAP/QAPP. This section describes the laboratory QA/QC procedures that are required of each laboratory that analyzes field samples from OU3.

6.3.1 Laboratory Quality Assurance Management Plan

Each analytical laboratory has developed a laboratory-specific *QA Management Plan* that provides a detailed description of the procedures and policies that are in place at their laboratory to ensure laboratory quality. This laboratory *QA Management Plan* will include information on standard laboratory methods and SOPs, instrument testing, inspection, maintenance, and calibration requirements, procedures for inspection of supplies and consumables, analyst training, facility contamination monitoring, and internal auditing. These laboratory *QA Management Plans* are reviewed and approved by the LC when the subcontracting agreement is established. Copies of all laboratory *QA Management Plans* for each project laboratory are maintained by the LC. The QATS contractor will also review the laboratory *QA Management Plan* during the annual EPA laboratory audit (see Section 8.1.2).

6.3.2 Certifications

All analytical laboratories participating in the analysis of samples for the Libby project are subject to national, local, and project-specific certifications and requirements. Each laboratory is accredited by the National Institute of Standards and Technology (NIST)/NVLAP for the analysis of bulk asbestos by PLM. This includes the analysis of NIST/NVLAP standard

reference materials (SRMs), or other verified quantitative standards, and successful participation in two proficiency rounds per year each of bulk asbestos by PLM.

Copies of recent proficiency examinations from NVLAP or an equivalent program are maintained by each participating analytical laboratory. Many of the laboratories also maintain certifications from other state and local agencies. Copies of all proficiency examinations and certifications are also maintained by the LC.

Each laboratory working on the Libby project is also required to pass an on-site EPA laboratory audit. The details of this EPA audit are discussed in Section 8.1.2. The LC also reserves the right to conduct any additional investigations deemed necessary to determine the ability of each laboratory to perform the work. Each laboratory also maintains appropriate certifications from the state and possibly other certifying bodies (e.g., New York State Department of Health (NYSDOH)) for methods and parameters that may also be of interest to the Libby project. These certifications require that each laboratory has all applicable state licenses and employs only qualified personnel. Laboratory personnel working on the Libby project are reviewed for requisite experience and technical competence to perform asbestos analyses. Copies of personnel resumes are maintained for each participating laboratory by the LC in the Libby project file.

6.3.3 Laboratory Team Training/Mentoring Program

Initial Mentoring

The orientation program to help new laboratories gain the skills needed to perform reliable analyses at the Site involves successful completion of a training/mentoring program that was developed for new laboratories prior to their analysis of Libby field samples. All new laboratories are required to participate in this program. The program includes training provided by the QATS contractor and/or senior personnel from other Libby team laboratories. The training/mentoring process includes a review of morphological, optical, chemical, and electron diffraction characteristics of LA, as well as training on project-specific analytical methodology, documentation, and administrative procedures used on the Libby site. The mentoring process also includes a general EPA audit, which is performed by the QATS contractor, to determine the general capabilities of the laboratory, the adequacy of facilities and instrumentation, and evaluate of the laboratory quality management system. The mentor will also review the analysis of at least one sample by each type of analytical method with the trainee laboratory.

Once the laboratory has satisfactorily completed the training/mentoring program, they can begin to support the analysis of Libby field samples. Initially, all submitted analytical results will undergo a detailed data verification and validation review (see Section D2). The frequency of these reviews can be reduced if no issues are identified. The QATS contractor may also perform a subsequent EPA audit to evaluate analyses of Libby field samples.

Site-Specific Reference Materials

USGS has also prepared site-specific reference materials for LA in soil to be utilized during PLM visual estimation analysis (EPA 2008f). These reference materials were prepared by adding aliquots of LA spiking material to uncontaminated Libby soils to obtain nominal LA concentrations of 0.2% and 1.0% (by weight). Each laboratory was provided with samples of

these reference materials for use in training PLM analysts in the visual estimation of LA levels in soil. In addition, aliquots of these reference materials (as well as other spiked soils) are also utilized as PE standards to evaluate PLM laboratory accuracy.

Regular Technical Discussions

On-going training and communication is an essential component of QA for the Libby project. To ensure that all laboratories are aware of any technical or procedural issues that may arise, a regular teleconference is held between the EPA, their contractors, and each of the participating laboratories. Other experts (e.g., USGS) are invited to participate when needed. These calls cover all aspects of the analytical process, including sample flow, information processing, technical issues, analytical method procedures and development, documentation issues, project-specific laboratory modifications, and pertinent asbestos publications.

Professional/Technical Meetings

Another important aspect of laboratory team training has been the participation in technical conferences. The first of these technical conferences was hosted by USGS in Denver, Colorado, in February 2001, and was followed by another held in December 2002. The Libby laboratory team has also convened on multiple occasions at the ASTM Johnston Conference in Burlington, Vermont, including in July 2002, July 2005, July 2008, and July 2011, and at the Michael E. Beard Asbestos Conference in San Antonio, Texas in January 2010. In addition, members of the Libby laboratory team attended an EPA workshop to develop a method to determine whether LA is present in a sample of vermiculite attic insulation held in February 2004 in Alexandria, Virginia. These conferences enable the Libby laboratory and technical team members to have an on-going exchange of information regarding all analytical and technical aspects of the project, including the benefits of learning about developments by others.

6.3.4 Analyst Training

All PLM analysts for the Libby project are expected to be familiar with routine chemical laboratory procedures, principles of optical mineralogy, and proficient in EPA Method 600/R-93/116, NIOSH Method 9002, CARB Method 435, and Site-specific SOPs SRC-LIBBY-01 and SRC-LIBBY-03. Analysts with less than one year of experience specific to the Libby project are required to participate in the laboratory mentoring program to obtain additional guidance and instruction. This training is provided by the laboratory managers and/or senior PLM analysts that are familiar with the types of asbestos and analytical challenges encountered at the Site. Before performing any Site analyses, the analyst must demonstrate the ability to generate acceptable accuracy and precision for the LA-specific reference materials.

Satisfactory completion of each of these training tasks must be approved by a senior PLM analyst. A training checklist or logbook is used to ensure that the analyst has satisfactorily completed each specific training requirement. It is the responsibility of the laboratory QAM to ensure that all analysts have completed the required training requirements.

6.3.5 Modification Documentation

When changes or revisions are needed to improve or document specifics about analytical methods or procedures used by the laboratory, these changes are documented using a laboratory ROM form (see **Appendix B**). The laboratory ROM form provides a standardized format for

tracking procedural changes in sample analysis and allows project managers to assess potential impacts on the quality of the data being collected. Laboratory ROMs will be completed by the appropriate laboratory or technical staff. Once a form is prepared, it is submitted to the EPA RPM for review and approval. Copies of approved laboratory ROMs are available in the Libby Laboratory eRoom.

6.3.6 Analytical Laboratory QC Analyses

Laboratory QC for PLM-Grav is ensured through compliance with laboratory-based QC requirements for the NIOSH Method 9002, as specified by NVLAP. No additional project-specific QC requirements have been established for PLM-Grav.

Laboratory-based QC requirements for PLM-VE are specified in SOP SRC-LIBBY-03. Three types of laboratory-based QC analyses are performed for PLM-VE, including laboratory duplicates, inter-laboratory analyses, and PE standards. Detailed information on the Libby-specific requirements for each type of PLM-VE QC analysis, including the minimum frequency rates, selection procedures, acceptance criteria, and corrective actions are provided in SOP SRC-LIBBY-03, with the following investigation-specific modifications:

- Laboratory QC sample frequency requirements should be applied on an OU3-specific basis.

With the exception of inter-laboratory analyses, it is the responsibility of the laboratory manager to ensure that the proper number of PLM-VE QC analyses is completed. Inter-laboratory analyses for PLM-VE will be selected post hoc by the QATS contractor (or their designee) in accordance with the selection procedures presented in SOP SRC-LIBBY-03. The LC will provide the list of selected inter-laboratory analyses to the laboratory manager and will facilitate the exchange of samples between the analytical laboratories.

6.4 INSTRUMENT MAINTENANCE AND CALIBRATION

6.4.1 Field Equipment

All field equipment should be maintained and calibrated in basic accordance with manufacturer specifications. When a piece of equipment is found to be operating incorrectly, the piece of equipment will be labeled “out of order” and placed in a separate area from the rest of the sampling equipment. The person who identified the equipment as “out of order” will notify the FTL overseeing the investigation activities. It is the responsibility of the FTL to facilitate repair of the out-of-order equipment. This may include having appropriately trained field team members complete the repair or shipping the malfunctioning equipment to the manufacturer. Field team members will have access to basic tools required to make field acceptable repairs. This will ensure timely repair of any “out of order” equipment.

6.4.2 Sample Preparation Equipment

Soil processing instrumentation requiring calibration or routine function checks include sample grinders, drying ovens, ventilation hood, high-efficiency particulate air (HEPA) vacuum, hood anemometer, and the analytical balance. A detailed description of the calibration and maintenance procedures for each type of equipment is provided in the *Soil Sample Preparation Work Plan*.

Calibration and maintenance checks are documented on equipment-specific calibration and maintenance log sheets, as provided in SOP ISSI-LIBBY-01, Attachments 4 through 6. These calibration and maintenance log sheets are kept in a ringed binder, pre-numbered with the equipment number and arranged according to equipment type. It is the responsibility of the SPF QAM (or their designee) to verify that the calibration of each piece of equipment is checked daily and is operating within normal parameters.

6.4.3 Laboratory Instruments

The laboratory manager is responsible for ensuring that all laboratory instruments used for this project are maintained and calibrated in accordance with the manufacturer's instructions. If any deficiencies in instrument function are identified, all analyses shall be halted until the deficiency is corrected. The laboratory shall maintain a log that documents all routine maintenance and calibration activities, as well as any significant repair events, including documentation that the deficiency has been corrected.

6.5 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

6.5.1 Field

In advance of field activities, the FTL will check the field equipment/supply inventory and procure any additional equipment and supplies that are needed. The FTL will also ensure any in-house measurement and test equipment used to collect data/samples as part of this SAP/QAPP is in good, working order, and any procured equipment is acceptance tested prior to use. Any items that the FTL determines unacceptable will be removed from inventory and repaired or replaced as necessary.

6.5.2 Laboratory

The laboratory managers are responsible for ensuring that all reagents and disposable equipment used in this project are free of asbestos contamination. This is demonstrated by the collection of blank samples.

SECTION 7 DATA MANAGEMENT

All data generated as part of the Vermiculite Waste Removal Action will be maintained in an OU3-specific Microsoft Access® database. This will be a relational database with tables designed to store information on station location, sample collection details, preparation and analysis details, and analytical results.

7.1 ROLES AND RESPONSIBILITIES FOR DATA FLOW

7.1.1 Field Personnel

Remedium contractors (MWH and Chapman Construction Inc.) will perform all sample collection in accordance with this SAP/QAPP. In the field, sample details will be documented on hard copy media-specific FSDS forms and in field log books. COC information will be documented on hard copy forms. FSDS and COC information will be manually entered by Remedium's field data manager (or their designee) into a field-specific[c] OU3 database using electronic data entry forms. Use of electronic data entry forms ensures the accuracy of data entry and helps maintain data integrity. For example, data entry forms utilize drop-down menus and check boxes whenever possible. These features allow the data entry personnel to select from a set of standard inputs, thereby preventing duplication and transcription errors and limiting the number of available selections (e.g., media types). In addition, entry into a database allows for the incorporation of data entry checks. For example, the database will allow a unique sample ID to only be entered once, thus ensuring that duplicate records cannot be created.

Entry of FSDS forms and COC information will be completed weekly, or more frequently as conditions permit. Copies of all FSDS forms, COC forms, and field log books will be scanned and posted in portable document format (PDF) to the OU3 eRoom[d] site on a weekly basis. This eRoom will have controlled access (i.e., user name and password are required) to ensure data access is limited to appropriate project-related personnel. File names for scanned FSDS forms, COC forms, and field log books will include the sample date in the format YYYYMMDD to facilitate document organization (e.g., FSDS_20110412.pdf). Electronic copies of all digital photographs will also be posted weekly to the Libby OU3 eRoom. File names for digital photographs will include the station identifier, the sample date, and photograph identifier (e.g., ST-1_20110412_12345.tif).

After FSDS data entry is completed, a copy of the field-specific OU3 database will be posted by the field data manager to the Libby OU3 eRoom weekly, or more frequently as conditions

[c] The field-specific OU3 database is a simplified version of the master OU3 database. This simplified database includes only the station and sample recording and tracking tables, as well as the FSDS and COC data entry forms.

[d] https://team.cdm.com/eRoom/mt/LibbyOU3

permit. The field-specific OU3 database posted to the eRoom site will include the post date in the file name (e.g., FieldOU3DB_20110516.mdb).

7.1.2 Troy SPF Personnel

All soil sample preparation will be performed by the Troy SPF. The Troy SPF utilizes a local SPF Scribe project database to maintain soil sample preparation information. Soil preparation information from the preparation log sheets is entered into the local SPF Scribe project database by SPF personnel. After the data entry is checked against the original forms, it is the responsibility of the SPF manager (or their designee) to publish soil sample preparation information from the local SPF Scribe database to Scribe.NET.

It is the responsibility of the OU3 data manager (CDM Smith) to subscribe to the SPF Scribe project database and upload relevant information on soil sample preparation (e.g., mass associated with each sample fraction) and COC tracking details for OU3 samples into the master OU3 project database.

7.1.3 Analytical Laboratory Personnel

As described in Section 5.2, each of the laboratories performing asbestos analyses for the sampling investigation are required to utilize all applicable OU3-specific Microsoft Excel® spreadsheets for asbestos data recording and electronic submittals. Upon completion of the appropriate analyses, EDDs along with scanned copies of all analytical laboratory data packages will be posted to the Libby OU3 eRoom.

7.1.4 Database Administrators

Day-to-day operations of the master OU3 database will be under the control of EPA contractors. The primary database administrator (CDM Smith) will be responsible for sample tracking, uploading new data, performing error checks, and making any necessary data corrections. New records will be added to the master OU3 database within an appropriate time period of FSDS and/or EDD receipt.

7.2 MASTER OU3 PROJECT DATABASE

The master OU3 project database is a relational Microsoft Access® database developed specifically for OU3. The *Libby OU3 Database User's Guide* provides an overview of the master OU3 project database structure and content. The most recent version of this User's Guide is provided on the OU3 website.

The master OU3 project database is kept on the CDM Smith server in Denver, Colorado. Incremental backups of the master OU3 project database are performed daily Monday through Friday, and a full backup is performed each Saturday.

7.3 DATA REPORTING

Field summary reports are prepared by MWH. Analytical results summaries are included in the OU3 investigation-specific SAPs and will be provided in the Data Summary Report (in preparation), which are available on the OU3 website. Specialized requests for data summaries may be submitted to the EPA RPM.

7.4 DATA STORAGE

All original data records (both hard copy and electronic) will be cataloged and stored in their original form until otherwise directed by the EPA RPM. At the termination of this project, all original data records will be provided to the EPA RPM for incorporation into the Site project files.

SECTION 8 ASSESSMENT AND OVERSIGHT

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that any deviations from procedures are documented. These reports also serve to keep management current on field activities.

8.1 ASSESSMENTS

8.1.1 Field Oversight

The EPA field oversight contractor (HDR Engineering) will perform field audits of sampling collection activities as part of the soil collection efforts. The EPA field auditor has the authority to direct changes in field activities, or to halt field activities if needed until a remedy to an unexpected problem can be identified. Field audit findings are documented in audit reports issued by the entity performing the audit, and are often discussed with the project management team before the auditors leave the Site. Corrective actions will be immediately implemented, as appropriate. A copy of the field audit report will be provided to the EPA RPM and the QATS contractor.

8.1.2 SPF Audits

Internal audits of the SPF are conducted by the SPF QAM periodically to evaluate personnel in their day-to-day activities and to ensure that all processes and procedures are performed in accordance with governing documents and SOPs. All aspects of sample preparation, as well as sample handling, custody, and shipping are evaluated. If any issues are identified, SPF personnel are notified and retrained as appropriate. Audit reports will be completed following each laboratory audit. A copy of the internal audit report, as well as any corrective action reports, will be provided to the LC and the QATS contractor.

Internal audits will be conducted following any significant procedural changes to the soil preparation processes or other SPF governing documents, to ensure the new methods are implemented and followed appropriately.

The Troy SPF is also required to participate in an annual on-site laboratory audit carried out by the EPA through the QATS contract. Audits consist of an evaluation of facility practices and procedures associated with the preparation of soil samples. A checklist of requirements, as derived from the applicable governing documents and SOPs, is prepared by the auditor prior to the audit, and used during the on-site evaluation. Evaluation of the facility is made by reviewing SPF documentation, observing sample processing, and interviewing personnel.

It is the responsibility of the QATS contractor to prepare an On-site Audit Report following the SPF audit. The On-site Audit Report includes both a summary of the audit results and completed checklist(s), as well as recommendations for corrective actions, as appropriate. Responses from each SPF to any deficiencies noted in the On-site Audit Report are also maintained with the respective reports.

It is the responsibility of the QATS contractor to prepare an On-Site Audit Trend Analysis Report on an annual basis. This report shall include a compilation and trend analysis of the on-

site audit findings and recommendations. The purpose of this reported is to identify SPF performance problems and isolate the potential causes.

8.1.3 Laboratory Audits

Each laboratory working on the Libby project is required to participate in an annual on-site laboratory audit carried out by the EPA through the QATS contract. These audits are performed by EPA personnel (and their contractors), that are external to and independent of, the Libby laboratory team members. These audits ensure that each analytical laboratory meets the basic capability and quality standards associated with analytical methods for asbestos used at the Libby site. They also provide information on the availability of sufficient laboratory capacity to meet potential testing needs associated with the Site.

External Audits

Audits consist of several days of technical and evidentiary review of each laboratory. The technical portion of the audit involves an evaluation of laboratory practices and procedures associated with the preparation and analysis of samples for the identification of asbestos. The evidentiary portion of the audit involves an evaluation of data packages, record keeping, SOPs, and the laboratory QA manual. A checklist of method-specific requirements for the commonly used methods for asbestos analysis is prepared by the auditor prior to the audit, and used during the on-site laboratory evaluation.

Evaluation of the capability for a laboratory to analyze a sample by a specific method is made by observing analysts performing actual sample analyses and interviewing each analyst responsible for the analyses. Observations and responses to questions concerning items on each method-specific checklist are noted. The determination as to whether the laboratory has the capability to analyze a sample by a specific method depends on how well the analysts follow the protocols detailed in the formal method, how well the analysts follow the laboratory-specific method SOPs, and how the analysts respond to method-specific questions.

Evaluation of the laboratory to be sufficient in the evidentiary aspect of the audit is made by reviewing laboratory documentation and interviewing laboratory personnel responsible for maintaining laboratory documentation. This includes personnel responsible for sample check-in, data review, QA procedures, document control, and record archiving. Certain analysts responsible for method quality control, instrument calibration, and document control are also interviewed in this aspect of the audit. Determination as to the capability to be sufficient in this aspect is made based on staff responses to questions and a review of archived data packages and QC documents.

It is the responsibility of the QATS contractor to prepare an On-site Audit Report for each analytical laboratory participating in the Libby program. These reports are handled as business confidential items. The On-site Audit Report includes both a summary of the audit results and completed checklist(s), as well as recommendations for corrective actions, as appropriate. Responses from each laboratory to any deficiencies noted in the On-site Audit Report are also maintained with the respective reports.

It is the responsibility of the QATS contractor to prepare an On-Site Audit Trend Analysis Report on an annual basis. This report shall include a compilation and trend analysis of the on-

site audit findings and recommendations. The purpose of this reported is to identify common asbestos laboratory performance problems and isolate the potential causes.

Internal Audits

Each laboratory will also conduct periodic internal audits of their specific operations. Details on these internal audits are provided in the laboratory QA Management Plan. The laboratory QAM should immediately contact the LC and the QATS contractor if any issues are identified during internal audits that may impact data quality for OU3 samples.

8.2 RESPONSE ACTIONS

Corrective response actions will be implemented on a case-by-case basis to address quality problems. Minor actions taken to immediately correct a quality problem will be documented in the applicable field or laboratory logbooks and a verbal report will be provided to the appropriate manager (e.g., the FTL or LC). Major corrective actions will be approved by the EPA RPM and the appropriate manager prior to implementation of the change. Major response actions are those that address problems that may affect the quality or objective of the investigation, this includes, but is not limited to, quality control issues; missing, broken, or compromised samples; station accessibility issues; and changes in field schedules or analytical deliverable dates. The EPA RPM for OU3 will be notified when quality problems arise that cannot be corrected quickly through routine procedures (contact information is provided below):

Christina Progess
U.S. EPA Region 8
1595 Wynkoop Street
Denver, CO 80202
Tel: (303) 312-6009
Fax: (303) 312-7151
E-mail: progess.christina@epa.gov

In addition, when modifications to this SAP/QAPP are required, either for field or laboratory activities, a ROM must be completed and approved by the EPA RPM prior to implementation.

8.3 REPORTS TO MANAGEMENT

No regularly-scheduled written reports to management are planned as part of this project. However, reports will be provided to management for routine audits and whenever quality problems are encountered. Field and analytical staff will promptly communicate any difficulties or problems in implementation of the SAP/QAPP to the EPA, and may recommend changes as needed. If any revisions to this SAP/QAPP are needed, the EPA RPM will approve these revisions before implementation by field or analytical staff.

SECTION 9 DATA VALIDATION AND USABILITY

9.1 DATA REVIEW, VERIFICATION AND VALIDATION

9.1.1 Data Review

Data review of project data typically occurs at the time of data reporting by the data users and includes cross-checking that sample IDs and sample dates have been reported correctly and that calculated analytical sensitivities or reported values are as expected. If discrepancies are found, the data user will contact the database administrator (CDM Smith), who will then notify the appropriate entity (field, preparation facility, or laboratory) in order to correct the issue.

9.1.2 Criteria for LA Measurement Acceptability

For PLM analyses, the following factors will be considered in determining the acceptability of LA measurements soil samples:

- *Results of performance evaluation (PE) standard analyses.* PLM accuracy of visual estimation results is evaluated using LA-specific PE standards. If the results for these PE standards are not within the project-specific acceptance criteria, results should be given low confidence.
- *Results of QC samples.* This includes field, preparation, and laboratory QC samples. If agreement between original and repeat analyses (i.e., duplicate analyses, inter-laboratory analyses) is strongly discordant, results for those samples should be given low confidence. If significant LA contamination is detected in preparation blanks, all samples prepared on that day should be considered to be potentially biased high.

9.1.3 Data Verification Method

Data verification includes checking that results have been transferred correctly from the original hand-written, hard copy field and analytical laboratory documentation to the OU3 project database. The goal of data verification is to identify and correct data reporting errors.

For analytical laboratories that utilize the OU3-specific EDD spreadsheets, data checking of reported analytical results begins with automatic QC checks that have been built into the spreadsheets. In addition to these automated checks, a detailed manual data verification effort will be performed for 100% of all soil samples and analysis results. This data verification process utilizes Site-specific SOPs developed to ensure PLM results and field sample information in the OU3 database are accurate and reliable:

- EPA-LIBBY-10 – *SOP for PLM Data Review and Data Entry Verification* – This Site-specific SOP describes the steps for the verification of PLM analyses, based on a review of the laboratory bench sheets, and verification of the transfer of results from the bench sheets into the project database.
- EPA-LIBBY-11 – *SOP for FSDS Data Review and Data Entry Verification* – This Site-specific SOP describes the steps for the verification of field sample information, based on a review of the FSDS form, and verification of the transfer of results from the FSDS

forms into the project database. An FSDS review is performed on all samples selected for PLM data verification.

The data verification review ensures that any data reporting issues are identified and rectified to limit any impact on overall data quality. If issues are identified during the data verification, the frequency of these checks may be increased as appropriate.

Data verification will be performed by appropriate CDM Smith staff who are familiar with project-specific data reporting, analytical methods, and investigation requirements. The data verifier will prepare a data verification report (template reports are included in the SOPs) to summarize any issues identified and necessary corrections. A copy of this report will be provided to the appropriate project data manager, LC, and the EPA RPM. It is the responsibility of the OU3 database manager (CDM Smith) to coordinate with the FTL and/or LC to resolve any OU3 project database corrections and address any recommended field or laboratory procedural changes from the data verifier. The OU3 database manager is also responsible for electronically tracking in the project database which data have been verified, who performed the verification, and when.

9.1.4 Data Validation Method

Unlike data verification, where the goal is to identify and correct data reporting errors, the goal of data validation is to evaluate overall data quality and to assign data qualifiers, as appropriate, to alert data users to any potential data quality issues. Data validation will be performed by the QATS contractor (or their designee), with support from technical support staff that are familiar with project-specific data reporting, analytical methods, and investigation requirements.

Data validation for asbestos should be performed in basic accordance with the *National Functional Guidelines (NFG) for Asbestos Data Review* (EPA 2011d), and should include an assessment of the following:

- Internal and external field audit/surveillance reports
- Field ROMs
- Field QC sample results
- Internal and external laboratory audit reports
- Laboratory contamination monitoring results
- Laboratory ROMs
- Internal laboratory QC analysis results
- Inter-laboratory analysis results
- Performance evaluation results
- Instrument checks and calibration results
- Data verification results (i.e., in the event that the verification effort identifies a larger data quality issue)

A comprehensive data validation effort for OU3 should be completed quarterly and results should be reported as a technical memorandum. This technical memorandum shall detail the

validation procedures performed and provide a narrative on the quality assessment for each type of asbestos analysis, including the data qualifiers assigned, and the reason(s) for these qualifiers. The technical memorandum shall detail any deficiencies and required corrective actions.

Electronic files summarizing the records that have been validated, the date they were validated, any recommended data qualifiers and their associated reason codes should be posted to the OU3 eRoom. It is the responsibility of the OU3 data manager (CDM Smith) to ensure that the appropriate data qualifiers and reason codes recommended by the data validator are added to the project database, and to electronically track in the project database which data have been validated, who performed the validation, and when. For this project, 100% of all soil samples and analyses will need to be validated.

In addition to performing quarterly data validation efforts, it is the responsibility of the QATS contractor to perform a "real-time" evaluation of all blanks, to ensure that any potential contamination issues are quickly identified and resolved. If any blank results are outside the acceptable limits, the QATS contractor should immediately contact the EPA RPM to ensure that appropriate corrective actions are made.

9.2 RECONCILIATION WITH USER REQUIREMENTS

Once all samples have been collected and analytical data has been generated, data will be evaluated to determine if study objectives were achieved. It is the responsibility of data users to perform a data usability assessment to ensure that DQOs have been met, and reported investigation results are adequate and appropriate for their intended use. This data usability assessment should utilize results of the data verification and data validation efforts to provide information on overall data quality specific to each investigation.

The data usability assessment should evaluate results with regard to several data usability indicators, including precision, accuracy and bias, representativeness, comparability, completeness, and whether specified analytic requirements (e.g., sensitivity) were achieved. **Table 9-1** provides detailed information for how each of these indicators may be evaluated for the reported asbestos data. The data usability assessment results and conclusions should be included in any investigation-specific data summary reports.

Non-attainment of project requirements may result in additional sample collection or field observations in order to achieve project needs.

SECTION 10 REFERENCES

Amandus HE, Wheeler R. 1987. The Morbidity and Mortality of Vermiculite Miners and Millers Exposed to Tremolite-Actinolite: Part II. Mortality. Am. J. Ind. Med. 11:15-26.

EPA. 1991. Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. Memo from Don R. Clay, Assistant Administrator, dated April 22, 1991. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. OSWER Directive 9355.0-30.

EPA. 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Publication 9285.7-081.

EPA. 2001. EPA Requirements for Quality Assurance Project Plans. EPA QA/R-5. U.S. Environmental Protection Agency, Office of Environmental Information. EPA/240/B-01/003. March 2001.

EPA. 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G4. U.S. Environmental Protection Agency, Office of Environmental Information. EPA/240/B-06/001. February 2006.

EPA. 2007a. Phase I Sampling and Analysis Plan for Operable Unit 3 Libby Asbestos Superfund Site. September 26, 2007.

EPA. 2007b. Summary Report for Data Collected under the Supplemental Remedial Investigation Quality Assurance Project Plan Libby, Montana Superfund Site. U.S. Environmental Protection Agency, Region 8. October.

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

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

EPA. 2008d. Framework for Investigating Asbestos-Contaminated Sites. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Asbestos Committee of the Technical Review Workgroup. OSWER Directive #9200.00-68.

EPA. 2008e. Performance Evaluation of Laboratory Methods for the Analysis of Asbestos in Soil at the Libby, Montana Superfund Site. Produced by Syracuse Research Corporation for EPA, Region 8. Draft – October 7, 2008.

EPA. 2008f. Characteristic EDS Spectra for Libby-Type Amphiboles. Produced by Syracuse Research Corporation for EPA, Region 8. Final – March 18, 2008.

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

EPA. 2010a. Phase IV Sampling and Analysis Plan, Remedial Investigation for Operable Unit 3, Libby Asbestos Superfund Site, Part A: Data to Support Human health Risk Assessment. U.S. Environmental Protection Agency, Region 8. June 2010.

EPA. 2010b. ProUCL Version 4.00.05 Technical Guide (Draft). U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-07/041. May 2010. <http://www.epa.gov/esd/tsc/ProUCL_v4.00.05/ProUCL_v4.00.05_tech_guide(draft).pdf >

EPA. 2010c. Activity-Based Sampling Summary Report, Operable Unit 4, Libby, Montana, Superfund Site. U.S. Environmental Protection Agency, Region 8. June 2.

EPA. 2011b. IRIS Toxicological Review of Libby Amphibole Asbestos (External Review Draft). U.S. Environmental Protection Agency. Washington, D.C> EPA/635/R-11/022A.2011.

EPA. 2011c. Framework for Investigating Asbestos-Contaminated Superfund Sites, Addendum, Toxicity Values and Risk Equations for Libby Amphibole Asbestos. Draft October 20, 2011.

EPA. 2011d. National Functional Guidelines for Asbestos Data Review. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. Draft – August 2011.

EPA. 2012a. Human Health Risk Assessment for Non-Asbestos Contaminants Operable Unit 3, Libby Asbestos Superfund Site, Libby, Montana. Draft January 23, 2012.

EPA. 2012b. Baseline Ecological Health Risk Assessment for Non-Asbestos Contaminants Operable Unit 3, Libby Asbestos Superfund Site, Libby, Montana. Draft January 25, 2012.

EPA. 2012c. Nature and Extent of LA Contamination in Surface Water and Sediment. Sampling and Analysis Plan/Quality Assurance Project Plan. Libby Asbestos Superfund Site, Operable Unit 4, Libby, Montana. April 2012.

EPA. 2012d. 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. May 2012.

International Organization for Standardization (ISO). 1995. Ambient Air – Determination of asbestos fibres – Direct-transfer transmission electron microscopy method. ISO 10312:1995(E).

McDonald JC, McDonald AD, Armstrong B, Sebastien P. 1986. Cohort study of mortality of vermiculite miners exposed to tremolite. Brit. J. Ind. Med. 43:436-444.

McDonald JC, Harris J, Armstrong B. 2004. Mortality in a cohort of vermiculite miners exposed to fibrous Amphibole in Libby, Montana. Occup. Environ. Med. 61:363-366.

McDonald JC, McDonald AD, Armstrong B, Sebastien P. 1986. Cohort study of mortality of vermiculite miners exposed to tremolite. Brit. J. Ind. Med. 43:436-444.

Meeker GP, Bern AM, Brownfield IK, Lowers HA, Sutley SJ, Hoeffen TM, Vance JS. 2003. The Composition and Morphology of Amphiboles from the Rainy Creek Complex, Near Libby, Montana. American Mineralogist 88:1955-1969.

Nelson W. 1982. *Applied Life Data Analysis.* John Wiley & Sons, New York. pp 438-446.

Peipins LA, Lewin M, Campolucci S, Lybarger JA, Miller A, Middleton D, et al. 2003. Radiographic abnormalities and exposure to asbestos-contaminated vermiculite in the community of Libby, Montana, USA. Environ. Health Perspect. 111:1753-1759.

Rohs AM, Lockey JE, Dunning KK, Shulka R, Fan H, Hilbert T, Borton E, Wiot J, Meyer C, Shipley RT, LeMasters GK, Kapol V. 2007. Low level Fiber Induced Radiographic Changes Caused by Libby Vermiculite: A 25 year Follow-up Study. Am J Respiratory and Critical Care Medicine. Published online December 6, 2007 as doi:10.1164/rccm.200706-814OC.

Sullivan PA. 2007. Vermiculite, Respiratory Disease and Asbestos Exposure in Libby, Montana: Update of a Cohort Mortality Study. Environmental Health Perspectives doi:10.1289/ehp.9481 available online at http://dx.doi.org.

FIGURES

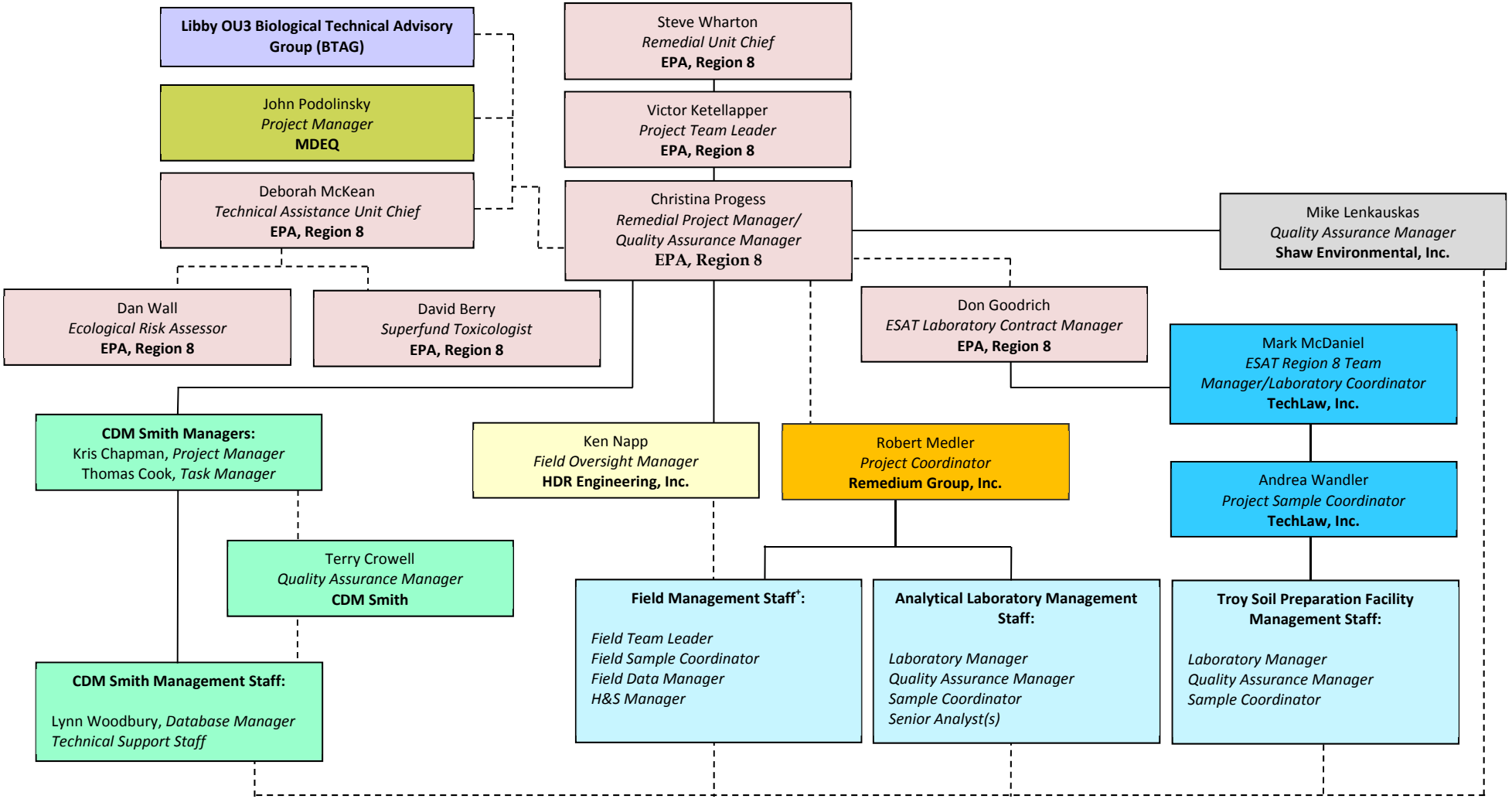


FIGURE 1-1. OU3 ORGANIZATIONAL CHART FOR WASTE REMOVAL ACTION

Figure 2-1
Libby Asbestos Superfund Site
Operable Unit 3 (Study Area)

OU3 (Study Area) - Mine & Kootenai River

Date: October 7, 2010

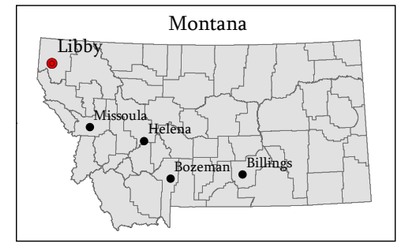
Map Projection: UTM, Meters, Zone 11N, NAD83

Data Sources: *Operable Units* - U.S. EPA Region 8 (2010);
Imagery - 1-meter USDA NAIP (2009).

0 1 2 Miles

0 1 2 Kilometers

N



Path: R:\2603-VolpeLibby\GIS\MXD_MineLibby_OU3_20120307.mxd

\\Usslc1s01\IFO_CAD\LIBBY_MONTANA\NEW Figure 3-2 Waste Removal Project Location.ai 11 Sep 2012

LEGEND

- Asbestos sampling location
- Test pit
- Contours 10 ft
- Contours 2 ft
- Estimated margin of waste vermiculite
- Margin concealed, inferred or otherwise not confirmed by excavation

N W E S

0 50 100 150 200

Feet

TITLE:

Waste Removal Project Location

PROJECT:

Libby, MT

REFERENCE(S): Coordinate System: NAD 1983 HARN StatePlane Montana FIPS 2500 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983 HARN
Units: Foot

MWH

Remedium

FIGURE

3-2

TABLES

TABLE 1-1. QA/R5 QAPP ELEMENT CROSS-REFERENCE

QA/R-5 QAPP Element	Phase V Part A SAP/QAPP Document Location
Group A. Project Management	
A1. Title & Approval Sheet	Approval Page (pg. 3)
A2. Table of Contents	Table of Contents (pg. 7-10)
A3. Distribution List	Distribution List (pg. 5)
A4. Project/Task Organization	Section 1, Figure 1-1
A5. Problem Definition & Background	Section 2, Section 2.1 to 2.4
A6. Project/Task Description	Section 4, Section 3.2.4, Section 3.3.4
A7. Quality Objectives & Criteria	Section 3.2 to 3.3, Table 9-1
A8. Special Training/Certifications	Field – Section 6.1.1 Analytical Laboratory – Section 6.3.2 to 6.3.4 Troy SPF – Section 6.2.1
A9. Documentation & Records	Field – Section 4.5, Section 4.9.1, Section 6.1.2 Analytical Laboratory – Section 5.2, Section 6.3.5 Troy SPF – Section 5.2, Section 6.2.2
Group B. Data Generation & Acquisition	
B1. Sampling Process Design (Experimental Design)	Section 4.1 to 4.3
B2. Sampling Methods	Section 4.2 to 4.4
B3. Sample Handling & Custody	Field – Section 4.9 Analytical Laboratory – Section 5.4 Troy SPF – 5.4
B4. Analytical Methods	Section 5.1, Section 5.3, Section 5.5, Appendix G
B5. Quality Control	Field – Section 6.1 Analytical Laboratory – Section 6.3 Troy SPF – Section 6.2
B6. Instrument/Equipment Testing, Inspection, & Maintenance	Field – Section 6.4.1 Analytical Laboratory – Section 6.4 Troy SPF – Section 6.4.2
B7. Instrument/Equipment Calibration & Frequency	Field – Section 4.4.2, Section 6.4.1 Analytical Laboratory – Section 6.3.1, Section 6.4.3 Troy SPF – Section 6.4.2
B8. Inspection/Acceptance of Supplies & Consumables	Field – Section 6.5.1 Analytical Laboratory – Section 6.5.2 Troy SPF – Section 6.5.2
B9. Non-direct Measurements	NA
B10. Data Management	Section 7.1 to 7.4
Group C. Assessment & Oversight	
C1. Assessments & Response Actions	Field – Section 8.1.1 Analytical Laboratory – Section 8.1.3 Troy SPF – Section 8.1.2
C2. Reports to Management	Section 8.3, Section 9.1.4
Group D. Data Validation & Usability	
D1. Data Review, Verification, & Validation	Section 9.1
D2. Verification & Validation Methods	Section 9.1.3 to 9.1.4
D3. Reconciliation with User Requirements	Section 9.2

NA – not applicable
QAPP – quality assurance project plan
SAP – sampling and analysis plan
SPF – sample preparation facility

TABLE 9-1. GENERAL EVALUATION METHODS FOR ASSESSING ASBESTOS DATA USABILITY

Data Usability Indicator	General Evaluation Method
Precision	Sampling – Review results for co-located samples and field duplicates to provide information on variability arising from medium spatial heterogeneity and sampling and analysis methods. Soil Preparation – Review results for preparation duplicates to provide information on variability arising from sample preparation and analysis methods. Analysis – Review results for PLM laboratory duplicates, TEM recounts, and TEM repreparations to provide information on variability arising from analysis methods. Review results for inter-laboratory analyses to provide information on variability and potential bias between laboratories.
Accuracy/Bias	TEM – Calculate the background filter loading rate and use results to assign detect/non-detect in basic accordance with ASTM 6620-00. For air samples, determine the frequency of indirect preparation. PLM – Review results for LA-specific performance evaluation standards to provide information on direction/magnitude of potential bias. Review results for blanks to provide information on potential contamination.
Representativeness	Review relevant field audit report findings and any field/laboratory ROMs for potential data quality issues.
Comparability	Compare the sample collection SOPs, preparation techniques, and analysis methods to previous investigations.
Completeness	Determine the percent of samples that were able to be successfully collected and analyzed in accordance with the investigation-specific SAP requirements (e.g., 99 of 100 samples, 99%).
Sensitivity	TEM – Determine the fraction of all analyses that stopped based on the area examined stopping rule (i.e., did not achieve the target sensitivity).

ASTM = American Society of Testing and Materials
LA = Libby amphibole
PLM = polarized light microscopy
QATS = Quality Assurance Technical Support
ROM = record of modification
SAP = sampling and analysis plan
SOP = standard operating procedure
TEM = transmission electron microscopy

APPENDICES

APPENDIX A

Standard Operating Procedures (SOPs)**

**The most recent versions of field SOPs, FSDS forms, and COC forms are provided electronically in the OU3 eRoom (*https://team.cdm.com/eRoom/mt/LibbyOU3*). The most recent versions of laboratory and data verification SOPs are provided electronically in the Libby Lab eRoom (*https://team.cdm.com/eRoom/mt/LibbyLab*).

APPENDIX B

Record of Modification Forms

FIELD MODIFICATION APPROVAL FORM
LFM-OU3-01
Libby OU3 Phase V SAP/QAPP (Rev. 0)

Requested by: _____ Date: _____

Description of Deviation:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

☐ EPA Region 8 has reviewed this field modification approves as proposed.

☐ EPA Region 8 has reviewed this field modification and approves with the following exceptions:

_____

_____

_____

_____

_____

_____

_____

☐ EPA Region 8 has reviewed this field modification and does not agree with the proposed approach for the following reasons:

_____

_____

_____

_____

_____

_____

_____ _____

Christina Progess, EPA RPM Date

Request for Modification
to
Laboratory Activities
LB-0000XX

Instructions to Requester: E-mail form to contacts at bottom of form for review and approval.

All Labs Applicable Forms – copies to: EPA LC, QATS contractor, All Project Labs

Individual Labs Applicable Forms – copies to: EPA LC, QATS contractor, Initiating Lab

Method (circle all applicable):

	TEM-AHERA	TEM-ISO 10312	PCM-NIOSH 7400
EPA/600/R-93/116	ASTM 5755	TEM 100.2	SRC-LIBBY-03
SRC-LIBBY-01	NIOSH 9002	Other:_____	

Requester:_____ Title: _____

Company: _____ Date: _____

Original Requester: _____ Original Request Date: _____

[only applicable if modification is a revision of an earlier modification]

Description of Modification:

_____

Reason for Modification:

_____

Potential Implications of this Modification:

_____

Laboratory Applicability (circle one): **All** **Individual(s)** _____

This laboratory modification is (circle one): **NEW** **APPENDS to** _____ **SUPERCEDES** _____

Duration of Modification (circle one):

Temporary Date(s): _____

Analytical Batch ID: _____

Temporary Modification Forms – Attach legible copies of approved form with all associated raw data packages

Permanent (Complete Proposed Modification Section) Effective Date: _____

Permanent Modification Forms – Maintain legible copies of approved form in a binder that can be accessed by analysts.

Proposed Modification to Method (attach additional sheets if necessary; state section and page numbers of method when applicable):

_____

EFERENCES

Data Quality Indicator (circle one) – Please reference definitions below for direction on selecting data quality indicators:

Not Applicable **Reject** **Low Bias** **Estimate** **High Bias** **No Bias**

DATA QUALITY INDICATOR DEFINITIONS:

Reject - Samples associated with this modification form are not useable. The conditions outlined in the modification form adversely affect the associated sample to such a degree that the data are not reliable.

Low Bias - Samples associated with this modification form are useable, but results are likely to be biased low. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated low.

Estimate - Samples associated with this modification form are useable, but results should be considered approximations. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimates.

High Bias - Samples associated with this modification form are useable, but results are likely to be biased high. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated high.

No Bias - Samples associated with this modification form are useable as reported. The conditions outlined in the modification form suggest that associated sample data are reliable as reported.

Technical Review: _____ Date: _____
(Laboratory Manager or designate)

Project Review and Approval: _____ Date: _____
(USEPA: Project Manager or designate)

Approved By: _____ Date: _____
(USEPA: Technical Assistance Unit Chief or designate)

MOD No.: SPF-_____

Request for Modification
To
Soil Sample Preparation Activities

Instructions to Requester: E-mail form to contacts at bottom of form for review and approval.

File approved copy at the Sample Preparation Facility (SPF).

Requester:_____ Title: _____

Company: _____ Date: _____

Effective Date: _____

Description of Modification:

_____

_____

Reason for Modification:

_____

_____

Potential Implications of this Modification:

_____

_____

Duration of Modification (circle one):

Temporary Date(s): _____

Preparation Batch ID:_____

- Temporary Modification Forms – Attach legible copies of approved form with all associated chain-of-custody forms. Also, maintain legible copies of approved form in a binder that can be accessed by SPF personnel.

Permanent (complete Proposed Modification to Method)

- Permanent Modification Forms – Maintain legible copies of approved form in a binder that can be accessed by CSF personnel.

Proposed Modification to Method (attach additional sheets if necessary; state section and page numbers of Method when applicable):

_____

_____

_____

_____

Technical Review: _____ Date: _____

(SPF Manager or designate)

Approved By:_____ Title: _____ Date: _____

(USEPA: Project Chemist or designate)

APPENDIX C

Field Sample Data Sheets (FSDS) Forms**

**The most recent versions of field SOPs, FSDS forms, and COC forms are provided electronically in the OU3 eRoom (*https://team.cdm.com/eRoom/mt/LibbyOU3*). The most recent versions of laboratory and data verification SOPs are provided electronically in the Libby Lab eRoom (*https://team.cdm.com/eRoom/mt/LibbyLab*).

Event ID

Libby Soil-like Sample & Location
Field Sample Data Sheet

FSDS # **S - «seq»**

Address _____ Date _____

Property ID: AD- _____ Logbook #_____ Pgs_____ Sampler(s)**_____

	Data Item	1	2	3
*	**Location ID**			
*	**Is this a new Location**	Yes No Revised *If No, "Z" through location section*	Yes No Revised *If No, "Z" through location section*	Yes No Revised *If No, "Z" through location section*
*	**Location Type**			
*	**Location Description**			
	Location Area (ft^2)			
	Location Comment			
	Location Comment2			
*	**Visible Vermiculite**	N___ L___ M___ H___	N___ L___ M___ H___	N___ L___ M___ H___
*	**Soil Depth Top**	Inches	Inches	Inches
*	**Soil Depth Bottom**	Inches	Inches	Inches
	Visible Vermiculite SubLocation			
	Visible Vermiculite Comments			
*	**Sample Collected**	Yes No *If No, "Z" through sample section*	Yes No *If No, "Z" through sample section*	Yes No *If No, "Z" through sample section*
*	**Sample ID**			
*	**Sample Time**			
*	**ABS**	N Y	N Y	N Y
*	**Sample Venue**	Indoor Outdoor NA	Indoor Outdoor NA	Indoor Outdoor NA
*	**Sample PrePostClear**	NA Pre Post Clear: 1st 2nd 3rd 4th 5th 6th 7th	NA Pre Post Clear: 1st 2nd 3rd 4th 5th 6th 7th	NA Pre Post Clear: 1st 2nd 3rd 4th 5th 6th 7th
*	**Sample Type**	FS FD Other_____	FS FD Other_____	FS FD Other_____
	Sample Parent ID			
*	**Composite**	Y N	Y N	Y N
*	**Sample/Inspection Aliquots**	30 Other _____ 0	30 Other _____ 0	30 Other _____ 0
	Sample Location Description			
	Sample Field Comments			

V 120120 ***Required Field** ****List company after Sampler(s) if not "CDM Smith"** "Soil Depth Top" & "Soil Depth Bottom" refer to VV &/or sample

For Field Team Completion: Completed by: _____ QC by:_____

For Data Entry: Entered by:_____ QC by:_____

APPENDIX D

Chain-of-Custody (COC) Form**

**The most recent versions of field SOPs, FSDS forms, and COC forms are provided electronically in the OU3 eRoom (*https://team.cdm.com/eRoom/mt/LibbyOU3*). The most recent versions of laboratory and data verification SOPs are provided electronically in the Libby Lab eRoom (*https://team.cdm.com/eRoom/mt/LibbyLab*).

INTERNAL CHAIN OF CUSTODY

10/27/2011 2:47:07 PM

Order ID: 271101481

Attn: Robert Marriam
Remedium Group, Inc.
Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119
Fax: (901) 820-2061 Phone: (901) 820-2023

Project: **Sample Retrieval Below Amphitheater**

Customer ID: REME44
Customer PO:
Received: 10/27/11 1:07 PM

EMSL Order: 271101481
EMSL Proj ID: OU3 Mine, Libby, MT
Cust COC ID

Test: PLM NIOSH 9002 **Matrix** Soils **TAT:** 6 Hour **Qty:** 3

Acct Sts: N30 **Slsprsn:** rdemalo **Logged:** rmahoney **Date:** 10/27/2011

Inter-Lab Sample Transfer

Samples Relinquished: _____ Date _____
Samples Received: _____ Date _____
Package Mailed to Westmont: _____ Date _____
Method of Delivery: _____

Includes: (Circle)
Benchsheets Sample Slides Sample filters
Micrographs GridBox Other_____

Final Package Received:_____ Date:_____

Sample Condition: ☒ Acceptable ☐ Unacceptable

Comments

Initial Prep (Initials/Lab): KC **Date:** 10/27/11
Filter Prep (Initials/Lab): _____ **Date:** _____
Grid Prep (Initials/Lab): _____ **Date:** _____

For Special Projects Use Only:

QC Selection: _____ **Date:** _____
Date Package Review: _____ **Date:** _____
Date Package Mailed: _____ **Date:** _____

Special Instructions

Order ID	Lab Sample #	Cust. Sample #	Location	Due Date
271101481	271101481-0001	1	N.W. Corner	10/27/2011 7:07:00 PM
271101481	271101481-0002	2	Next to ISCO	10/27/2011 7:07:00 PM
271101481	271101481-0003	3	S.E. Corner	10/27/2011 7:07:00 PM

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*:

271101481

REME44

EMSL ANALYTICAL, INC.
107 W. FOURTH ST.
LIBBY, MT 59923
PHONE: (406) 293-9066
FAX: (406) 293-7016

Company: CHAPMAN CONSTRUCTION	EMSL-Bill to: ☐ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: P.O. BOX 516	*Third Party Billing requires written authorization from third party*
City: LIBBY, MONTANA State/Province: MT	Zip/Postal Code: 59923 Country: USA
Report To (Name): MIKE CHAPMAN	Fax #: 406-293-8305
Telephone #: 406-293-1983	Email Address: chapman@montanasky.net
Project Name/Number: SAMPLE REGIONAL BELOW AMPHITHEATER	
Please Provide Results: ☐ Fax ☒ Email	Purchase Order: U.S. State Samples Taken:

Turnaround Time (TAT) Options* -- Please Check

☐ 3 Hour ☒ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

**For TEM Air 3 hours/6 hours, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT** (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

KC 10/27/11

☐ **Check For Positive Stop -- Clearly Identify Homogenous Group**

Samplers Name: MIKE CHAPMAN **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
#1	N.W. Corner		10/27/11 - 12:15 p.m.
#2	Next to ISCO		10/27/11 - 12:28 p.m.
#3	South East Corner		10/27/11 - 12:25 p.m.

Client Sample # (s): - **Total # of Samples:** 3

Relinquished (Client): **Date:** 10-27-11 **Time:** 1:07

Received (Lab): R.K. Mahoney **Date:** 10/27/11 **Time:** 1307

Comments/Special Instructions:

APPENDIX E

Analytical Requirements Sheet

SAP ANALYTICAL SUMMARY # OU3AMP-0912
SUMMARY OF PREPARATION AND ANALYTICAL REQUIREMENTS

SAP Title: Work Plan for Removal of Asbestos-Containing Vermiculite Waste Near the "Amphitheater" at Libby Asbestos Superfund Site OU3; Part B SAP/QAPP

SAP Date/Revision: September 2012 (Rev. 0)

EPA Technical Advisor: Christina Progess (303-312-6009, progess.christina@epa.gov)
(contact to advise on DQOs of SAP related to preparation/analytical requirements)

Sampling Program Overview: This SAP/QAPP describes soil sample collection efforts that will be conducted during the removal of asbestos-containing vermiculite waste near the "Amphitheater" at OU3 to characterize LA concentrations in soil post-removal.

Estimated number and timing of field samples:
>> Soil sampling (September) = 15 samples + field and preparation QC samples

Index ID Prefix: VW-1xxxx

PLM Preparation and Analytical Requirements for Soil Samples:

Medium Code	Medium	Preparation Method[a]	Analysis Method[b]	Applicable Laboratory Modifications
A	Soil	ISSI-LIBBY-01 Rev. 11	PLM-Grav: SRC-LIBBY-01 Rev. 3 PLM-VE: SRC-LIBBY-03 Rev. 3	N/A

[a] Sample preparation to be performed at the Troy sample preparation facility and shipped to the PLM analytical laboratory.
[b] After sample preparation, multiple aliquots will be generated for each sample. The analytical laboratory should do the following for each aliquot:
A (archive) – place sample in archive
C (coarse) – analyze sample by PLM-Grav
FG1 (fine ground aliquot #1) – analyze sample by PLM-VE
FG2-4 (fine ground aliquots #2 to #4) – place samples in archive

---

Laboratory Quality Control Sample Frequencies:
PLM [c]:
Lab Duplicates – 10% (cross-check 8%; self-check 2%)
Inter-laboratory – 1% [d]

[c] See SRC-LIBBY-03 for selection procedure and QC acceptance criteria.
[d] *Post hoc* selection to be performed by the QATS contractor.

Requirements Revision:

Revision #:	Effective Date:	Revision Description
0	9/5/12	--

Asbestos Analytical Laboratory Review Sign-off:

☐ ESAT [sign & date:_____] ☐ MAS [sign & date:_____]

[Checking the box and signing (electronically) above indicates that the laboratory has reviewed and acknowledged the preparation and analytical requirements associated with the specified SAP.]

September 14, 2012 (Rev. 2)

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

Prepared for and with oversight by:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 8

Prepared by:

MWH Americas, Inc.
2890 E. Cottonwood Parkway Suite 300
Salt Lake City, Utah 84121

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

Work Plan for Removal of Asbestos-containing Vermiculite Waste Near the "Amphitheater" at Libby Asbestos Superfund Site OU3

1.0 PROJECT OVERVIEW

While considering various alignments for re-routing Rainy Creek as part of a preliminary evaluation of potential site remediation scenarios, asbestos-containing vermiculite waste material (waste material) was discovered in October 2011 south of and below the "Amphitheater" at Operable Unit 3 (OU3). The Amphitheater is a portion of the site used for staging soil removed from OU4 (the town of Libby) before it is transported to the top of the former mine for disposal (see Figure 1).

As discovered during subsequent investigation in October 2011, the size of the waste material ranges up to 7 mm in diameter and is covered by vegetation over much of its areal extent. The material is present over approximately five acres below the Amphitheater, north and south of the Rainy Creek channel. Based on a few widely-spaced shovel-dug potholes, the estimated average thickness of the waste material is about 12 inches. Assuming these estimates, the volume of the asbestos-containing vermiculite waste material is about 8,100 cubic yards.

The waste area is well outside the naturally-occurring vermiculite deposit and it is obvious the material has been crushed and screened. The material is purported to be sediment dredged from the bottom of nearby Mill Pond (Figure 1).

1.1 Purpose of this Document

This Work Plan is intended to serve as a guide to the removal and disposal of the asbestos-containing vermiculite waste material below the Amphitheater. Because the purpose of the proposed action is simple excavation and transport of a single medium, rather than multi-media sampling for environmental characterization, detailed protocols provided in previous OU3 project sampling and analysis plans (SAPs) and standard operating procedures (SOPs) are not included herein. Relevant project SOPs are covered comprehensively in project documents produced by the United States Environmental Protection Agency, Region 8 (USEPA) for the Remedial Investigation that are available in the OU3 eRoom[1], and are incorporated by reference in this Work Plan. All work performed as part of this removal action will be in strict accordance with the requirements of the Administrative Settlement Agreement and Order on Consent for Removal Action (AOC) between USEPA and W. R. Grace & Co. (Grace).

2.0 BACKGROUND AND PROBLEM DEFINITION

2.1 Site Description

The former Zonolite vermiculite mine is a portion of OU3 of the Libby Asbestos Superfund Site. The former mine is approximately 6.5 miles east of Libby, Montana. The mining-disturbed area of the mine property is approximately 1,100 acres. Vermiculite was mined there by numerous concerns beginning in the early 20th century; from 1963 through 1990, the mine, mills and associated processes were operated by Grace. The mine was closed by Grace in 1990 due to a decrease in demand for vermiculite. As part of the Superfund designation of the Libby Asbestos Site, USEPA initiated a Remedial Investigation/Feasibility Study (RI/FS) at OU3 in October, 2007.

[1] The most recent versions of all OU3-specific SOPs are provided at: https://team.cdm.com/eRoom/mt/LibbyOU3

Aside from being the single largest known deposit of vermiculite in the world, the Zonolite deposit is unique in that it contains an assemblage of amphibole asbestos minerals known as Libby Amphibole ("LA"). Asbestos is not commonly associated with vermiculite; in the Zonolite deposit, asbestos was introduced to the vermiculite by hydrothermal waters, millions of years after the emplacement of the vermiculite.

The mined deposit is in the form of a dome, in the center of a roughly circular basin rimmed with Precambrian Belt Formation limestone and quartzite. The rim is from 400 to 900 feet above the top of the mine. The basin is drained by Fleetwood Creek (around the north flank of the vermiculite dome) and by Carney Creek around the south flank. These creeks are tributaries to Rainy Creek, a much larger stream that heads at an elevation of 5,500 feet on the slope of Blue Mountain, about five miles north-northwest of the mine. Rainy Creek and Fleetwood Creek flow into the mine tailings dam. High water flows during spring snowmelt that cannot be contained by the dam flow through a box culvert and a spillway, re-joining the Rainy Creek channel below the dam. Carney Creek joins Rainy Creek downstream of the tailings dam and the Mill Pond (see Figure 1). From the area of the mine, Rainy Creek flows southwest about two miles to the Kootenai River, a major tributary to the Columbia River system.

2.2 Problem Definition

Based on field investigation in October 2011, the channel of Rainy Creek flows near or through the waste vermiculite below the Amphitheater and may be a source of elevated LA levels detected in lower Rainy Creek. To eliminate or mitigate this potential continuing source of LA to lower Rainy Creek, the asbestos-containing vermiculite waste material will be excavated and transported to the disposal area at the top of the former mine that is used to dispose of LA-containing soil removed as part of the remediation of OU4, the town of Libby.

3.0 SUMMARY OF EXISTING SITE DATA

3.1 Asbestos-containing Vermiculite Waste Material

Three samples of the waste vermiculite were collected by personnel from Chapman Construction on October 27, 2011. The sample locations are depicted on Figure 1. The samples were analyzed by EMSL Laboratories in Libby, Montana by NIOSH PLM Method 9002, Issue 2. As shown on Figure 1, Sample 1 reported a result of 4% LA, Sample 2 reported 3% LA, and Sample 3 reported 4% LA. The sample chains-of-custody, analytical sheet and the test report are included in Attachment 1 of this work plan.

Further investigation of the nature, thickness, and extent of the vermiculite waste was performed in July 2012. A tire-mounted backhoe was used to excavate 19 test pits across the affected area. Two basic types of waste were found in the test pits: a coarse-grained greenish-black material (primarily located north of Rainy Creek), and a fine, powdery bronze material most prevalent south of Rainy Creek. Waste thickness ranges from less than one inch near the margins to more than 3 feet in berms and piles on the area south of Rainy Creek.

4.0 REMOVAL AND DISPOSAL OF WASTES

4.1 Kickoff Meeting

A project kick-off meeting will be held prior to the start of waste material removal field operations. The meeting will be held at the Grace decontamination area on Highway 37, just east and across from the OU3 security gate. Topics for discussion at the meeting will include confirmation of project objectives, removal methods, characterization sampling, OU3 traffic rules and procedures and health and safety. Attendees will include project personnel from MWH and Chapman Construction and interested parties from PRI-ER, CDM Smith, Montana DEQ and.

4.2 Site Preparation

The work area will be flagged with "Caution" tape to prevent unauthorized persons from entering the waste removal area. A haul road out of the removal area will be improved if necessary, or constructed along the west margin of the Amphitheater to allow haul trucks to avoid traveling on the paved portion of Rainy Creek Road and to prevent traffic congestion at the Amphitheater transfer and decontamination area. To permit movement of trucks and equipment between the two removal areas north and south of Rainy Creek without using Rainy Creek Road, a bridge will be placed across Rainy Creek.

4.3 Storm Water/Sediment Control

The *Construction Operations Best Management Practices (Stormwater Management Plan) Operable Unit 3 Libby Asbestos Superfund Site, Libby, Montana* (USEPA, 2012) will be used as general guidance for the asbestos-containing vermiculite waste removal project and is incorporated by reference herein. Best Management Practices (BMPs) will be applied as appropriate to the conditions of the removal work site to ensure protection of the environment. The *Stormwater Management Plan* does not include best practices for all activities and potential activities that will be included in the waste removal action. Areas immediately adjacent to the banks of Rainy Creek along the reach of Rainy Creek that flows through the removal work site will require special procedures to prevent waste material from entering the stream (e.g., raking, removal by hand). Although initial examination suggests waste removal work will not be extensive along the banks of Rainy Creek, MDEQ and the Lincoln County Conservation District will be apprised and consulted prior to performing any work that has a potential to impact the stream.

Before removal of asbestos-containing vermiculite waste material, the outer edge of the waste removal area will be located. Once the outer edge of the waste removal area is located, the asbestos-containing vermiculite waste material will be removed from the perimeter of the work area and a silt fence will be immediately installed on the outside perimeter of the waste removal area. The silt fence will be installed to prevent sediments from running onto or off the waste removal area and will be installed around the entire perimeter of the work areas. Water that flows through the silt fence will be conducted around the waste removal site and diverted toward vegetated areas and away from Rainy Creek until vegetation is established on the waste removal site.

4.4 Excavation and Loading

Excavation of the waste material over much of the work area will be done with a track-mounted excavator to more precisely remove the waste material and minimize the amount of over-excavation and creation of excess waste volume to be transported and disposed. Excavator operators will take care to preserve the small trees that line the bank of Rainy Creek. If waste material is found to be around the base of these

trees or adjacent to the banks of Rainy Creek, it will be carefully removed by hand and if necessary, replaced with topsoil from OU4 that is stockpiled at the Amphitheater. If required, waste immediately adjacent to the banks of Rainy Creek will be removed by hand methods only.

Excavated materials will be placed in 10-cubic-yard dump trucks and transported to the disposal area. The haul truck route will be through or around the Amphitheater and will specifically avoid the paved section of Rainy Creek Road, where only properly decontaminated vehicles may travel.

During excavation and loading, the excavator, dump trucks and material to be excavated and removed will be continuously sprayed with water to suppress dust and prevent potential release of LA fibers into the atmosphere Dust suppression water (and all water used during the project) will be obtained from approved sources at locations outside OU3. MWH and Chapman Construction on-site personnel will follow the practices defined in their respective employers' OU3-specific Health and Safety Plans and will strictly adhere to the decontamination procedures in place at the Amphitheater prior to leaving the designated OU3 area.

4.5 Limit of Material Removal

The asbestos-containing vermiculite waste material has a greenish cast, a distinctive texture and a clearly visible, abrupt contact with the underlying dark native soil. A memorandum by Mark Nelson, P.G., of CDM is a summary of field observations he made of test pits in the waste area on August 8, 2012. His memo confirms the easily discriminated contrasts between the waste vermiculite and the native soil and is contained in Attachment 4 to this Work Plan. These visible and textural differences will be used to guide the depth of excavation and the area over which the waste will be removed. To avoid leaving waste material in-place, a small amount of assumed native soil will be over-excavated and disposed with the waste material. In addition to using the visible contrast between the waste material and the native soil to determine the depth and area of waste removal, characterization samples will be collected as discussed in Section 5.0 of this document and analyzed as discussed in Section 5.2. Additional details on sample collection are contained in the SAP/QAPP (Part B of this Work Plan).

4.6 Transport and Dumping

Filled dump trucks will travel about four miles up the main mine haul road and will place the waste material in USEPA-designated areas (See Figure 2). Because the waste material has been analyzed to contain greater than 1% LA, it will be covered with OU4 soils, as was done with disposed soils removed from OU2. Traffic control for the trucks hauling the vermiculite waste from the Amphitheater area will be coordinated with PRI-ER to ensure safe and efficient policies and practices are in place. Once all of the vermiculite waste has been removed and transported, soils from OU4 will be used as cover at the designated site and seeded with an MDEQ-approved grass mixture. Based on the estimated volume of waste materials, more than 900 truckloads of vermiculite waste will be transported to the top of the former mine, over a period of 30 to 60 days.

4.7 Site Restoration

The original, natural surface of the waste removal site is not known. The working assumption is that the waste material was placed on natural grade and that removal of the waste will restore the surface of the work site to the natural grade, but this will not be known until waste removal commences. Should additional soil be needed to adjust grade or fill erosional features or areas that may impound surface water, OU4 topsoil stockpiled at the Amphitheater may be used. Regardless of whether natural grade can

be determined, the finished surface will control surface water runoff from altering or eroding the waste removal area or Rainy Creek where it passes through the waste removal area. As further protection, silt fencing will be installed around the perimeters of the work areas and along both banks of Rainy Creek where it flows through the removal area.

4.7.1 Regrading

Regrading of the waste removal area will focus on creating a stable surface capable of supporting an appropriate mix of vegetation and preventing erosion. Regrading of the waste removal area will, to the extent possible at the time, be compatible with the regrading plans of the adjacent Amphitheater waste staging and transfer area.

4.7.2 Revegetating

A site-appropriate seed mix approved by MDEQ will be planted on the final surface of the waste removal area. Establishment of high-quality, approved vegetation will be a vital component to site stabilization. The restored area will be inspected at least monthly during Remedium contractor visits to the former mine area to inspect the dam and other features of the site. Because the restored waste-removal area is immediately adjacent to Rainy Creek Road, inspections to confirm that vegetation is healthy and free of noxious weeds, silt fences are in good repair, and that erosion is controlled will be easy and frequent. Silt fencing will remain in good repair until USEPA determines the site is stable without them. If needed, the silt fence will be repaired by re-staking, patching or replacement to ensure it remains effective in controlling sediment transport onto or off of the waste removal area.

4.7.3 Channel Stabilization/Realignment

The current approach to the waste removal does not involve changing the channel of Rainy Creek. Based on field observations, the existing channel is stable, established, and will not require stabilization or realignment.

4.7.4 High Water-Table and Seasonal Ponding

The current approach to waste removal and site restoration does not include backfilling to maintain grade or eliminate occasional or seasonal ponding of water. Small ephemeral ponds and areas of shallow standing water are produced seasonally throughout the mine area, particularly during snowmelt and on relatively flat, apparently natural-grade canyon floors. If waste removal reveals that the original, natural ground surface was not modified, but was simply covered and buried by waste, backfilling may not be necessary to restore the site and a stable, controlled-drainage surface. If channels or other erosional features are found on the native soil surface and backfill is needed to stabilize the surface and prevent erosion, OU4 soils stockpiled at the Amphitheater staging and transfer area will be used as backfill at the waste removal site.

4.8 Applicability of Montana Preservation Acts and Permitting

Portions of the channel of Rainy Creek were significantly altered to serve historic mine operations. The creek is currently impounded by the tailings impoundment dam and flows through drains along the toe of the dam or (during high flow rates from spring snowmelt) over a concrete spillway. Modifications to the stream course below the dam were made to store Rainy Creek water and collection structures were

installed to provide water to various mine processes, including mills. No alterations to the Rainy Creek channel will occur during the Amphitheater waste removal work.

4.8.1 Montana Natural Streambed and Land Preservation Act ("310 Permit")

Activities requiring a 310 Permit include "*Any activity that physically alters or modifies the bed or banks of a perennially flowing stream.*" As currently planned, the removal action will not require the alteration or modification of the bed or banks of Rainy Creek. BMPs (USEPA, 2012) will be implemented to protect the creek and the aquatic environment where Rainy Creek flows through the vermiculite waste area. Special methods to be employed near the stream (raking, hand-removal) are discussed in Section 4.4.

The purposes of the Montana Natural Streambed and Land Preservation Act are:

- *To minimize soil erosion and sedimentation.* Care will be taken and BMPs (USEPA, 2012) will be employed to ensure that removal activities will not increase erosion or sedimentation.
- *To protect and preserve streams and rivers in their natural or existing state*. Rainy Creek is not in a "natural state" from the north end of the tailings impoundment to the confluence with the Kootenai River, a distance of approximately three miles. There are numerous diversions through relict mine water collection and distribution works and through culverts under roads that were used to move the channel to accommodate Rainy Creek Road. BMPs will be used to ensure that the reach of Rainy Creek that flows through the waste removal area will be preserved in its existing state.

4.8.2 Montana Stream Protection Act (SPA 124 Permit)

Activities requiring an SPA 124 Permit include "Any project including the construction of new facilities or the modification, operation, and maintenance of an existing facility that may affect the natural existing shape and form of any stream or its banks or tributaries." The proposed waste removal action does not include construction, modification, operation or maintenance of an existing facility. The action will not alter the existing shape and form of the reach of Rainy Creek that flows through the waste removal area.

The purposes of the Montana Stream Protection Act are:

- *To protect and preserve fish and wildlife resources.* BMPs (USEPA, 2012) will be employed to ensure fish and wildlife resources are protected. Samples of water from Rainy Creek will be collected and analyzed for LA before, during and after removal operations to document any effects that may be related to the project. It is important to recognize, however, that LA concentrations in Carney Creek (which is tributary to Rainy Creek upstream of the removal work site) can be very high (it drains a waste-rock pile on the south flank of the former mine) and may create LA concentrations that are not representative of the quality of Rainy Creek above the confluence. To allow estimation of the LA contributions from Rainy Creek and Carney Creek, water samples will be collected for LA analysis bi-weekly from each creek, above their confluence, and from sampling station LRC-06, just upstream of where Rainy Creek passes through a culvert beneath Highway 37.

  To maintain streams and rivers in their natural or existing state. The removal action will be performed such that the existing course, character and state of Rainy Creek will not be altered.

4.9 Health and Safety

Project health and safety will follow guidance contained in the OU3-specific Health and Safety Plan (MWH, 2007), although each employer or contractor is responsible for providing and enforcing their own Health and Safety Plan (HASP), which shall be at least as protective of worker health and safety as the MWH HASP.

All personnel who will be involved in the removal have more than five years of experience in on-mine operations at OU3 and are familiar with site controls, driving rules, decontamination procedures and the proper use of Modified Level C personal protective equipment (PPE). The standard PPE for on-site work at OU3 consists of a full-face respirator fitted with P100 filter cartridges, two layers of footed/hooded Tyvek® coveralls, two layers of nitrile gloves taped to the wrists of the coveralls and latex boot covers taped to the legs of the coveralls. Rules for use of the haul road and coordination with other heavy equipment will be discussed with PRI prior to beginning the work.

To document that dust suppression efforts are effective during active excavation and loading, visual observation of the air around the work site will be made throughout the day by site personnel so that any needed changes to the dust suppression procedures can be made quickly.

5.0 CHARACTERIZATION SAMPLING

5.1 Sampling Locations

The five-acre waste removal area will be surveyed and divided into a grid of approximately fifteen 15,000 square-foot sampling cells. Characterization soil samples will be 30-point composite samples collected from the approximate center of each cell. Approximately 20 characterization samples will be collected and analyzed (see Section 5.10 for analysis requirements).

5.2 Sample Collection

Characterization soil samples will be collected in accordance with SOP No. 1, available in the OU3 eRoom. Samples will be placed in certified-clean sample containers provided by the laboratory and labeled with OU3-specific index identification labels provided by USEPA. A minimum of 10% replicate samples will be randomly collected and submitted "blind" to the laboratory, using fictitious but consistent identification numbers, to evaluate analytical quality. Index I.D. labels will be furnished by MWH and will bear the prefix VW ("vermiculite waste"). All sample QA/QC requirements are contained in Part B of this work plan, the QAPP.

5.3 Sampling Equipment Decontamination

It is anticipated that single-use sampling implements (e.g., trowels, spoons) will be used to collect characterization soil samples. If any non-dedicated (multiple-use) sampling equipment is used it will be decontaminated in accordance with SOP No. 7.

5.4 Sample Location Documentation

Sample locations and excavation boundaries will be flagged in the field and will be recorded using a hand-held global positioning system instrument, in accordance with SOP No. 11. This information will be recorded in the field logbook and on project-specific field sample data sheets (FSDS; an example of which is provided in Attachment 2).

5.5 Sample Handling

Characterization soil samples will be handled in accordance with SOP No. 8.

5.6 Field Documentation

Field logbooks, field sample identification, field sample data sheets, project photographs and sample labeling and sample chain-of-custody (COC) will be in accordance with SOP No. 9. An example project-specific COC is provided in Attachment 3.

5.7 Delivery of Samples

The sampling personnel will hand-deliver the characterization soil samples to the CDM Smith Soil Preparation Facility (SPF) in Troy, Montana the same day they are collected. If samples collected later in the day cannot be delivered before the SPF closes, they will be retained in the custody of the sampling personnel and be delivered the next day; there is no holding time or preservation requirement for samples of asbestos in soil, so data quality will not be affected.

5.8 Soil Sample Preparation

If required by USEPA, the soil samples will be prepared according to SOP ISSI-LIBBY-01 prior to analysis.

5.9 Analysis of Samples

Once the soil characterization samples have been prepared by the SPF, they will be shipped to MAS Laboratories of Suwanee, Georgia for analysis by PLM-VE according to Modified NIOSH Method 9002, Issue 2 under normal turn-around time.

5.10 Final Decontamination of Equipment

Chapman personnel will thoroughly decontaminate all excavation and hauling equipment at the conclusion of the project. All decontamination will follow standard procedures implemented at the Amphitheater site and will use off-site water. Decontamination will consist of complete removal by pressure washing of all soil, mud, and debris from all exposed surfaces of the equipment. Decontamination shall include removal and replacement of engine air filters. Decontaminated equipment will be inspected by CDM Smith personnel before it is allowed to leave the designated OU3 site.

6.0 PROJECT ROLES AND RESPONSIBILITIES

Earthmoving equipment and operators will be provided by Chapman Construction, Inc. of Libby, Montana (Chapman). Chapman will provide transportation of all project personnel to and from the work site and will be responsible for decontaminating all equipment used on the project. Project direction and oversight will be provided by MWH Americas, Inc. (MWH) personnel based in Salt Lake City, Utah. MWH will direct the removal of the waste material, maintain a written and photographic record of project activities, collect and maintain documentation and custody of samples, and deliver the samples to the laboratory. EPA will provide oversight along with its designated contract consultant.

7.0 LABORATORY ANALYSIS REQUIREMENTS, QUALITY CONTROL, DATA MANAGEMENT, ASSESSMENT AND OVERSIGHT, DATA VALIDATION AND USABILITY

Analytical laboratory and data quality requirements for the project will be in accordance with those detailed in the OU3-specific SOPs, as applicable and appropriate, and as modified by any special or project-specific requirements issued by USEPA. Any modifications will be specified in appropriate Record of Modification forms.

8.0 REPORTING

All reporting requirements specified in Section VIII of the AOC will be followed (e.g., progress reports, final report). At the conclusion of waste removal activities, MWH will prepare a summary report of site preparation, methods of waste removal, volume removed, analytical results for characterization samples, a map of the work area and locations of characterization samples. The report will include GPS coordinates for sample locations and points around the excavation area and photographs to document project activities.

9.0 REFERENCES

MWH, 2007: MWH Health and Safety Plan for Libby Asbestos Superfund Site, Revision 1, dated September 27, 2007.

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

U.S. Environmental Protection Agency Region 8, 2011: Libby Asbestos Superfund Site Operable Unit 3 Soil Disposal Plan.

U.S. Environmental Protection Agency Region 8, 2012: Construction Operations Best Management Practices (Stormwater Management Plan) Operable Unit 3 Libby Asbestos Superfund Site, Libby, Montana, working draft dated March 27, 2012.

FIGURES

\\Ussle1s01\FO_CAD\LIBBY_MONTANA\NEW Figure 1 Waste Removal Project Location.ai 11 Sep 2012

LEGEND

- Asbestos sampling location
- Test pit
- Contours 10 ft
- Contours 2 ft
- Estimated margin of waste vermiculite
- Margin concealed, inferred or otherwise not confirmed by excavation

N
W E
S

0 50 100 150 200
Feet

TITLE:
Waste Removal Project Location

PROJECT:
Libby, MT

REFERENCE(S): Coordinate System: NAD 1983 HARN StatePlane Montana FIPS 2500 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983 HARN
Units: Foot

MWH

Remedium

FIGURE
1

LEGEND

- Vermiculite Waste Removal Area
- Vermiculite Waste Disposal Location

N
W E
S

0 650 1,300 2,600

Feet

TITLE: **Vermiculite Waste Disposal Location**

PROJECT: Libby Asbestos Superfund Site OU3

REFERENCE(S): Imagery NAIP 2011:
NAD 1983 HARN StatePlane Montana
Units: Meters

MWH

Remedium

FIGURE **2**

ATTACHMENTS

ATTACHMENT 1

Chains-of-Custody and Test Reports for Vermiculite Samples Collected on October 27, 2011.

INTERNAL CHAIN OF CUSTODY

10/27/2011 2:47:07 PM

Order ID: 271101481

Attn: Robert Marriam
Remedium Group, Inc.
Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Fax: (901) 820-2061 Phone: (901) 820-2023

Project: **Sample Retrieval Below Amphitheater**

Customer ID: REME44
Customer PO:
Received: 10/27/11 1:07 PM

EMSL Order: 271101481
EMSL Proj ID: OU3 Mine, Libby, MT
Cust COC ID

Test: PLM NIOSH 9002 **Matrix** Soils **TAT:** 6 Hour **Qty:** 3

Acct Sts: N30 **Slsprsn:** rdemalo **Logged:** rmahoney **Date:** 10/27/2011

Inter- Lab Sample Transfer

Samples Relinquished: _____ Date _____
Samples Received: _____ Date _____
Package Mailed to Westmont: _____ Date _____
Method of Delivery: _____

Includes: (Circle)
Benchsheets Sample Slides Sample filters
Micrographs GridBox Other_____

Final Package Received: _____ Date: _____

Sample Condition: ☒ Acceptable ☐ Unacceptable

Comments

Initial Prep (Initials/Lab): KC **Date:** 10/27/11
Filter Prep (Initials/Lab): _____ **Date:** _____
Grid Prep (Initials/Lab): _____ **Date:** _____

For Special Projects Use Only:

QC Selection: _____ **Date:** _____
Date Package Review: _____ **Date:** _____
Date Package Mailed: _____ **Date:** _____

Special Instructions

Order ID	Lab Sample #	Cust. Sample #	Location	Due Date
271101481	271101481-0001	1	N.W. Corner	10/27/2011 7:07:00 PM
271101481	271101481-0002	2	Next to ISCO	10/27/2011 7:07:00 PM
271101481	271101481-0003	3	S.E. Corner	10/27/2011 7:07:00 PM

Asbestos Chain of Custody

EMSL Order Number (*Lab Use Only*): 271101481

REME44

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL ANALYTICAL, INC.
107 W. FOURTH ST.
LIBBY, MT 59923
PHONE: (406) 293-9066
FAX: (406) 293-7016

Company: CHAPMAN CONSTRUCTION	**EMSL-Bill to:** ☐ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: P.O. BOX 516	*Third Party Billing requires written authorization from third party*
City: LIBBY, MONTANA **State/Province:** MT	**Zip/Postal Code:** 59923 **Country:** USA
Report To (Name): MIKE CHAPMAN	**Fax #:** 406-293-8305
Telephone #: 406-293-1983	**Email Address:** chapman@montanasky.net
Project Name/Number: SAMPLE RETRIEVAL BELOW AMPHITHEATER	
Please Provide Results: ☐ Fax ☒ Email **Purchase Order:**	**U.S. State Samples Taken:**

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☒ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

**For TEM Air 3 hours/6 hours, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT (AHERA only)**
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

KC 10/27/11

☐ **Check For Positive Stop – Clearly Identify Homogenous Group**

Samplers Name: MIKE CHAPMAN **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
#1	N.W. Corner		10/27/11 - 12:15 p.m.
#2	Next to ISCO		10/27/11 - 12:20 p.m.
#3	South East Corner		10/27/11 - 12:25 p.m.

Client Sample # (s): - **Total # of Samples:** 3

Relinquished (Client): **Date:** 10-27-11 **Time:** 1:07

Received (Lab): R.K. Mahoney **Date:** 10/27/11 **Time:** 1307

Comments/Special Instructions:

EMSL Analytical, Inc.
107 West 4th Street, Libby, MT 59923
Phone: (406) 293-9066 Fax: Email: mobileasbestoslab@emsl.com

Attn: **Robert Marriam**
Remedium Group, Inc.
Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Fax: (901) 820-2061 Phone: (901) 820-2023
Project: **Sample Retrieval Below Amphitheater**

Customer ID: REME44
Customer PO:
Received: 10/27/11 1:07 PM
EMSL Order: 271101481

EMSL Proj: OU3 Mine, Libby, MT
Analysis Date: 10/27/2011

Test Report: Polarized Light Microscopy (PLM) Performed by Modified NIOSH Method 9002, Issue 2

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1 *271101481-0001*	N.W. Corner	Tan, Black Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	85% Mica 11% Non-fibrous (other)	4% **Tremolite/ Actinolite**
2 *271101481-0002*	Next to ISCO	Tan Non-Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	95% Mica 2% Non-fibrous (other)	3% **Tremolite/ Actinolite**
3 *271101481-0003*	S.E. Corner	Tan, Black Non-Fibrous Homogeneous	QC Type: Not QC Lab ID: EMSL27	94% Mica 2% Non-fibrous (other)	4% **Tremolite/ Actinolite**

Initial report from 10/27/2011 16:12:59

Analyst(s)
Kelly Colberg (3)

R. K. Mahoney, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

Polarized Light Microscopy (PLM) Performed by Modified NIOSH Method 9002, Issue 2

Client: Remedium Group, Inc. | Logged: 10/27/11 | TAT: 6 Hour

Address: Subsidiary of W.R. Grace
6401 Poplar Avenue, Suite 301
Memphis, TN 38119

Date/Time Due: 10/27/2011 7:07:00 PM

Fax: (901) 820-2061

Project: OU3 Mine, Libby, MT
Sample Retrieval Below Amphitheater

Special Instructions	Order Number
	271101481

Macroscopic

COLOR (C): 1 Brown, 2 Gray, 3 Tan, 4 White, 5 Red, 6 Various, 7 Black, 8 Silver, 9 Blue, 10 Yellow

TEXTURE (T): 1 Fibrous, 2 Non-Fibrous, 3 Other

HOMOGENEITY (H): 1 Homogeneous, 2 Heterogeneous, 3 OTHER, 4 Layers (#)

Treatment: 1 Teased, 2 Crushed, 3 Dissolve, 4 Ashed, 5 Heated, 6 Melted

COMPONENT TYPES

Asbestos: 1 Chrysotile, 2 Amosite, 3 Anthophyllite, 4 Tremolite, 5 Actinolite, 6 Crocidolite

Fibrous: 7 Cellulose, 8 Glass, 9 Min. Wool, 10 Synthetic, 11 Other, 12 Wollastonite, 13 Hair

Non-Fibrous: 14 Quartz, 15 Mica, 16 Gypsum, 17 Cal. Carbonate, 18 Matrix, 19 Perlite, 20 Other

MICROSCOPIC

Optical Properties

Morphology (M): 1 Wavy, 2 Straight, 3 Uniform Diameter, 4 Ribbon-Like, 5 Tapered Ends, 6 Scaled, 7 Pitted, 8 Medulla, 9 Exotic Shapes, 10 Other

Sign of Elongation (S): 1 +, 2 -, 3 Variable

Pleochroism (P): 1 Yes, 2 No

Birefringence (B): 1 Low 0.010, 2 Med 0.010-0.050, 3 High >0.050, 4 None 0.00 or Isotropic

Fiber Color (FC): 1 White, 2 Brown, 3 Beige, 4 Blue, 5 Green, 6 Colorless

Extinction (E): 1 Parallel, 2 Symmetrical, 3 Oblique, 4 Undulose

Sample	Macrosc.	Treat	Stereo Asbestos Est. %	Asbestos Type	% of Asbestos	Other Fibrous Type	Other Fibrous %	Non-Fibrous Type	Non-Fibrous %	Non-Asb Char. Ex. E4	Optical Properties
1	(C) 3,7	2,1	4	4/5	4			20	11		1.630 R.I. ⊥ / 1.637 R.I. ∥
	(T) 1							15	85		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
2	(C) 3	2,1	3	4/5	3			20	23 (10/27/11)		1.625 R.I. ⊥ / 1.631 R.I. ∥
	(T) 2							15	95		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
3	(C) 3,7	2,1	4	4/5	4			20	2		1.625 R.I. ⊥ / 1.633 R.I. ∥
	(T) 2							15	94		M 2 / S 1
	(H) 1										P 2 / B 1 / (FC) 6 / E 3
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)	Samples 1 & 3 are relatively the same coarseness,									P / B / (FC) / E
	(C)	micas range in size from 3 mm to 1 cm, Libby									∥ R.I.
	(T)	Amphibole bundles in these two samples are similar									S
	(H)	in size as well; none were larger than about 7 mm in length.									P / B / (FC) / E
	(C)	Sample 1 contains feldspar and diopside along with									∥ R.I.
	(T)	vermiculite & biotite and Libby Amphibole. Feldspars were									S
	(H)	not observed in Sample 3.									P / B / (FC) / E
	(C)	Sample 2 is fine in texture & consisting primarily									∥ R.I.
	(T)	of vermiculite. The Libby Amphibole bundles are → 1 or 2 mm									S
	(H)	Small and fine, ~~for~~ none greater than ~~5 mm~~ in length.									P / B / (FC) / E
	(C)	The vermiculite is ranges in size from 2 mm to 4 mm.									∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E
	(C)							20			⊥ R.I. / ∥ R.I.
	(T)										M / S
	(H)										P / B / (FC) / E

Analyst: KColberg Date: 10/27/11 Computer: _____ Date: _____

Room Temp (C): 21.2

Instructions: **All applicable data package deliverables are included in the following page. Using the print option will print out all forms necessary and in the appropriate order. Please provide information as directed.**

Laboratory Name: EMSL Analytical, Inc.
City/State: Libby, MT
Laboratory Job No.: 271101481
Method Utilized (SOP and Rev. No.): NIOSH Method
Circle One: Visual Estimation (NIOSH 9002) Point Counting Approach

Instructions: For PLM analytical results raw data packages, complete and sign the following checklist. Attach supporting documentation as outlined below. Organize the supporting documentation in the order listed below. Paginate the completed raw data package.

		Laboratory Verification (Initials and Date)	Validator Verification (Initials and Date)
1	**Number of samples received: 3** *An SDG is defined as no more than 100 samples.* **Additional Supporting Documentation:** Attach COC forms having footer R (report).	KC 10/27/11	
2	**Date of sample receipt and condition of samples** 10/27/2011 OK *For Condition of samples enter "OK" or "See SDG Case Narrative".*	KC 10/27/11	
3	**SDG Case Narrative:** **Additional Supporting Documentation:** Attach SDG Narrative and any modification forms.	KC 10/27/11	
4	**Check for contamination (daily):** Wipe microscope slides with lens paper before using. *Laboratory Verification initial and date signifies that this has been performed for the samples in this SDG.*	KC 10/27/11	
5	**Verification of the refractive indices of the refractive index liquids once per month:** **Additional Supporting Documentation:** Provide information indicating a monthly record of checking each of the four liquids including liquid name, lot number and analyst initials. (See table - Results of RI Liquids Calibration)	KC 10/27/11	
6	**Verification of microscope adjustments prior to each SDG:** *Laboratory Verification initial and date signifies that this has been performed for the samples in this SDG.*	KC 10/27/11	
7	**Hard copy data forms (as presented in the EDD spreadsheet):** **Additional Supporting Documentation:** Copies of the Hard Copy Data Forms for all investigative samples and laboratory duplicates will be provided from systems that are entered electronically.	KC 10/27/11	
8	**Bench sheets for data results:** **Additional Supporting Documentation:** Provide copies of the hand written or LIMS system generated raw data sheets for sample results.	KC 10/27/11	

ATTACHMENT 2

Field Sample Data Sheet for Characterization Soil Sampling

LIBBY OU3 PHASE FIELD SAMPLE DATA SHEET
CHARACTERIZATION SOIL SAMPLES

Station ID:_______________ **Sampling Date**:_______________

Field Logbook ID: ____ **Logbook Page No**:____________

For New Stations Only: **X coord**:______________ **Y coord**: ______________ **Elev**: ______________

GPS Coordinate System: UTM Zone 11 North, NAD83 datum, meters

Sampling Team: **MWH** **Samplers Initials:**____

Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type: Field Sample** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**___________ **Sampling Depth:**___________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**___________ **Sampling Depth:**___________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**___________ **Sampling Depth:**___________
Index ID	*AFFIX LABEL HERE*	**Sampling Time:**________________ **Sample Type:** **Media : Soil**	**Sampling Method (if applicable):** **Grab or Composite** **# of Composites:**___________ **Sampling Depth:**___________

COMMENTS:	

Notes:

FS Field Sample	**SP** Field Split Sample	**FD** Field Duplicate Sample
TB Trip Blank Sample	**MS** Matrix Spike Sample	**MSD** Matrix Spike Duplicate Sample
FB Field Blank Sample	**EB** Equipment Decon Blank Sample	**PE** Performance Evaluation Sample

Field Data Recorded by:		**Field Entries Checked by:**	

Database Entry by:	*Database QC by:*

ATTACHMENT 3

Chain-of-Custody Form for Characterization Soil Sampling.

LIBBY OU3 – CHARACTERIZATION SOIL SAMPLES CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

COC No. _______________

PAGE: _______ OF: _______

ENTERED BY (Signature): ______________________________ PROJECT MANAGER: __________________________________ DATE: ____________________

METHOD OF SHIPMENT: ______________________________ CARRIER/WAYBILL NO.: ________________ DESTINATION: ______________________________

SAMPLES					ANALYSIS REQUEST																													
					Asbestos			Non-Asbestos (a)																										
Index ID	Date	Time	Medium	Archive	TEM-ISO 10312 (b,c)	PLM (d)		TAL Metals+Boron	Mercury	TOC	DOC	Paste pH	Fluoride	Chloride, Sulfate	Total Phosphorus	Cyanide	VPH	EPH	OPP Pesticides	Chlorinated Pesticides	Herbicides	PCBs	SVOCs	VOCs	TDS, TSS, Nitrite, Alkalinity	Ammonia, Nitrate, TKN	Orthophosphate	Radiochemistry	Radium, Uranium					Remarks

	TOTAL NUMBER OF CONTAINERS	LABORATORY COMMENTS/CONDITION OF SAMPLES

RELINQUISHED BY:			DATE	TIME	RECEIVED BY:		
SIGNATURE	PRINTED NAME	COMPANY			SIGNATURE	PRINTED NAME	COMPANY

** Media: AQ - Aqueous SO – Solid AA – Ambient Air BK – Tree Bark DB – Organic Debris TC – Tree Age Core*

Notes --

(a) Method, container, and preservation details are provided in the attached tables

(b) With Libby-specific modifications. See Phase I OU3 SAP for counting and stopping rules

(c) For tree bark, preparation by TREE-LIBBY-OU3 rev0. For organic debris, preparation by DEBRIS-LIBBY-OU3 rev0

(d) Preparation by ISSI-LIBBY-01 rev8 and analysis by SRC-LIBBY-01 rev2 (PLM-Grav) and SRC-LIBBY-03 rev2 (PLM-VE)

DISTRIBUTION: PINK: Field Copy YELLOW: Return to Originator WHITE: Laboratory Copy

ATTACHMENT 4

August 20, 2012 Memo on Field Visit to Vermiculite Waste Pits from Mark Nelson, P.G., CDM Smith to Christina Progess, EPA

Memorandum

To: *Christina Progess, EPA Remedial Project Manager*

From: *Mark Nelson, PG*

Date: *August 20, 2012*

Subject: *August 8, 2012 Field Visit to the Former Vermiculite Mine, Operable Unit 3, Libby Asbestos Superfund Site, Libby, Montana*

On August 8, 2012, Mark Nelson PG, CDM Smith, attended a field visit to an area along Rainey Creek approximately 300 feet downstream from the mill pond where materials containing vermiculite are present. These materials are reported to have been produced during dredging of material from the mill pond and discharge of those materials to areas adjacent to Rainy Creek downstream from the mill pond (John Garr, MWH, personal communication August 8, 2012). These materials are referred to as "dredge spoils" in the sections that follow. Mr. Nelson was accompanied on this field visit by John Garr and Joan Kester (MHW), and Mike Chapman (earthwork contractor for MWH).

The purpose of this field visit was to observe the geological characteristics of the dredge spoils and to discern if the spoils could be delineated visually during a potential removal action currently being considered by EPA. Based on physical characteristics of the dredge spoils observed during the field visit and discussed below, delineation of these materials based on visual characteristics is viable using a weight of evidence approach based on the following characteristics:

- Mineralogical composition
- Color
- Grain size
- Soil structure
- Fluvial bedding

These characteristics are described in the following sections. It is recommended that delineation be conducted during excavation by a geologist with site-specific knowledge of contaminant source materials in the OU3 area.

Although visual delineation of the dredge spoils is viable to support the removal action, the visual characteristics are not adequate to discern between soils or sediments affected by physical dispersion of dredge spoils in the area and unaffected or "background" soils and sediments. However, visual delineation would be suitable to identify major accumulations of dredge spoils and to support a removal action to prevent future erosion of the identified dredge spoils into Rainy Creek.

Field Characteristics of Dredge Spoils

During the August 8, 2012 field visit, a series of small excavations was observed and several of these excavations were deepened using a backhoe to better expose the contact between the dredge spoils and underlying alluvial sediments. This field investigation included observation of approximately six excavations on the west side of Rainey Creek, observation of Rainey Creek sediments and adjacent riparian areas, and observation of approximately four excavations on the east side of Rainey Creek.

Photo 1. Excavation on west side of Rainey Creek showing an approximately 10-inch layer of dredge spoils overlying alluvial sediments.

Several physical characteristics that would facilitate visual delineation of the dredge spoils are shown in Photo 1, which was taken at one of the excavations located on the west side of Rainey Creek. The dredge spoils are evident as a surface layer overlying alluvial sediments. Based on

visual analyses, the dredge spoils at this location are composed of approximately 80 percent sand sized grains of micaceous minerals including biotite and vermiculite. In contrast, the underlying alluvial sediments are composed of clay, silt, and sand-sized fluvial sediments with local gravel and cobbles. The dredge spoils also exhibit a characteristic grayish-brown color, which contrasts with the medium-brown color of the underlying alluvial sediments.

Photo 2. Close-up photo of dredge spoil materials showing coarse sand grain size and characteristic color.

Photo 2 is a close-up photo of the dredge spoils showing coarse sand grain size and characteristic color. The grain size of the dredge spoils varies and ranges from coarse sand to fine sand, but the spoils commonly exhibit the characteristic mica-rich mineralogy with visual estimates ranging from 50 to 80 percent micaceous minerals.

A general lack of soil structure is also evident in the dredge spoils, which contrasts with the soil structure evident in the underlying alluvial sediments. Soil structure is affected by the clay content of the soil and other factors. The soil structure of the dredge spoils is not well-developed because the spoils contain relatively less clay as compared to underlying alluvial sediments, and the sand-sized micaceous grains generally do not adhere together well or form clumps. The soil structure of the relatively coarse grained dredge spoils is single grained and unconsolidated. In the fine sand sized dredge spoils, this leads to a fluffy unconsolidated texture. In contrast, the underlying alluvial sediments contain relatively more clay, which results in a blocky soil structure in which blocks or clumps of soil are observed during excavation. This contrast in soil structure would also support delineation of dredge spoils based

on visual characteristics during a potential removal action.

Photo 3. Bedding present in alluvial sediments underlying dredge spoils.

Photo 3 shows fluvial bedding that is evident in the alluvial sediments that underlie the dredge spoils. The surface layer of dredge spoils is evident in the photo based on the lighter grey-brown color. Underneath this zone is a sequence of alluvial sediments that exhibit characteristics of fluvial deposition including the presence of lenses of coarse sand, gravel and cobbles. These lenses of coarser grained sediments were emplaced during deposition under local higher-energy flow regimes within stream channels. The presence of this characteristic fluvial bedding in underlying alluvial materials would also support delineation of overlying dredge spoils during excavation.

Uncertainties in Visual Delineation of Dredge Spoils

Although visual delineation of dredge spoils is viable to support the potential removal action, uncertainties would be present particularly along the edges of the dredge spoil accumulations and adjacent to Rainey Creek. The characteristics of the downslope edge of the dredge spoils were observed on the east side of Rainey Creek. At this location, the surface layer of dredge spoils is only a few inches thick. It is likely that physical dispersion results in gradational contacts on the edges of major accumulations of dredge spoils, particularly on the downslope

edge. These areas would require careful observation and delineation during a potential removal action.

Riparian soils were observed along Rainey Creek in close proximity to known accumulations of dredge spoils. A discrete layer of dredge spoils was not observed in the riparian zone, although mica minerals including biotite and vermiculate are common within these soils. This suggests that erosion, reworking and deposition of dredge spoils along Rainy Creek have caused intermixing of riparian soils and dredge spoils directly adjacent to Rainey Creek. Removal of dredge spoils based on visual characteristics is not likely to be effective within these riparian soils. Common vermiculite was also observed within Rainy Creek sediments in this area. The extent to which this vermiculite is related to erosion of dredge spoils or other anthropogenic releases versus natural erosion of the vermiculite ore body over geological time cannot be determined based on evidence collected during the field visit.

EPA REGION 8 QA DOCUMENT REVIEW CROSSWALK

GRANTEE/ENTITY		**Program/State**	**EPA Superfund**
PROJECT TITLE	**Libby Asbestos Superfund Site, OU3**		
QAPP Preparer	**MWH Americas, Inc.**		
Period of Performance		**Date Submitted for Review**	**8/31/12**
EPA Project Officer **EPA Project Manager**	**Christina Progess**	**PO Phone #** **PM Phone #**	**303-312-6009**
QA Program Reviewer	**Dania Zinner/Christina Progess**	**Date of Review**	**9/4/12**

Documents Reviewed: **QAPP/date/cover period** *(Yes/No/Not Provided)* **Yes** **Work Plan/fiscal year/funding requested//Regulatory Authority** *(Yes/No/Not Provided)*	**SAP/QAPP for Libby Asbestos Superfund Site OU3, Rainy Creek Floodplain Removal Action**
Is QAPP consistent with the Work Plan (current/next year)? *(Yes/No)* **Yes**	
Summary of Comments: NA	

Note: In addition to addressing concerns in the Summary of Comments, the Grantee must also respond to the issues identified in the Comment section(s) that includes a **"Response (date)" and Resolved (date)".**

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
A1. Title and Approval Sheet			
a. Contains project title	Y	Title page (pg. 1)	
b. Date and revision number line (for when needed)	Y	Revision log (pg. 2)	
c. Indicates organization's name	Y	Title page (pg. 1)	
d. Date and signature line for organization's project manager	Y	Approval page (pg. 2)	
e. Date and signature line for organization's QA manager	Y	Approval page (pg. 2)	
f. Other date and signatures lines, as needed	Y	Approval page (pg. 2)	
A2. Table of Contents			
a. Lists QA Project Plan information sections	Y	Table of Contents (pg. 5-8)	
b. Document control information indicated	Y	Page footers	
A3. Distribution List			
Includes all individuals who are to receive a copy of the QA Project Plan and identifies their organization	Y	Distribution List (pg. 3-4)	
A4. Project/Task Organization			
a. Identifies key individuals involved in all major aspects of the project, including contractors	Y	Section 1.2, Figure 1-1	
b. Discusses their responsibilities	Y	Section 1.2.1 to 1.2.7	
c. Project QA Manager position indicates independence from unit generating data	Y	Section 1.2.7	
d. Identifies individual responsible for maintaining the official, approved QA Project Plan	Y	Section 1.2.2	
e. Organizational chart shows lines of authority and reporting responsibilities	Y	Figure 1-1	
A5. Problem Definition/Background			
a. States decision(s) to be made, actions to be taken, or outcomes expected from the information to be obtained	Y	Section 3.2.2	
b. Clearly explains the reason (site background or historical context) for initiating this project	Y	Section 2.1 to 2.2, Section 3.1, Section 3.2.1	

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
c. Identifies regulatory information, applicable criteria, action limits, etc. necessary to the project	Y	Soil – Section 3.2.5	
A6. Project/Task Description			
a. Summarizes work to be performed, for example, measurements to be made, data files to be obtained, etc., that support the project=s goals	Y	Section 4	
b. Provides work schedule indicating critical project points, e.g., start and completion dates for activities such as sampling, analysis, data or file reviews, and assessments	Y	Soil - Section 4.1.	
c. Details geographical locations to be studied, including maps where possible	Y	Soil - Section 3.2.4, Figure 1	
d. Discusses resource and time constraints, if applicable	Y		
A7. Quality Objectives and Criteria			
a. Identifies - performance/measurement criteria for all information to be collected and acceptance criteria for information obtained from previous studies, - including project action limits and laboratory detection limits and - range of anticipated concentrations of each parameter of interest	Y	Section 3 Soil – Section 3.2	
b. Discusses precision	Y	Table 9-1	
c. Addresses bias	Y		
d. Discusses representativeness	Y		
e. Identifies the need for completeness	Y		
f. Describes the need for comparability	Y		
g. Discusses desired method sensitivity	Y	Section 3.2.6, Section 5.1.1	
A8. Special Training/Certifications			
a. Identifies any project personnel specialized training or certifications	Y	Field – Section 6.1.1	

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
b. Discusses how this training will be provided	Y		
c. Indicates personnel responsible for assuring training/certifications are satisfied	Y	Analytical Laboratory – Section 6.3.2 to 6.3.4	
d. identifies where this information is documented	Y	Troy SPF – Section 6.2.1	
A9. Documentation and Records			
a. Identifies report format and summarizes all data report package information	Y	Field – Section 4.5, Section 4.9.1, Section 6.1.2	
b. Lists all other project documents, records, and electronic files that will be produced	Y	Analytical Laboratory – Section 5.2, Section 6.3.5	
c. Identifies where project information should be kept and for how long	Y		
d. Discusses back up plans for records stored electronically	Y	Troy SPF – Section 5.2, Section 6.2.2	
e. States how individuals identified in A3 will receive the most current copy of the approved QA Project Plan, identifying the individual responsible for this	Y	Section 1.2.2	
B1. Sampling Process Design (Experimental Design)			
a. Describes and justifies design strategy, indicating size of the area, volume, or time period to be represented by a sample	Y	Soil– Section 4.1 to 4.2	
b. Details the type and total number of sample types/matrix or test runs/trials expected and needed	Y		
c. Indicates where samples should be taken, how sites will be identified/located	Y		
d. Discusses what to do if sampling sites become inaccessible	Y		
e. Identifies project activity schedules such as each sampling event, times samples should be sent to the laboratory, etc.	Y		
f. Specifies what information is critical and what is for informational purposes only	Y		

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
g. Identifies sources of variability and how this variability should be reconciled with project information	Y		
B2. Sampling Methods			
a. Identifies all sampling SOPs by number, date, and regulatory citation, indicating sampling options or modifications to be taken	Y	Section 4.2	
b. Indicates how each sample/matrix type should be collected	Y		
c. If in situ monitoring, indicates how instruments should be deployed and operated to avoid contamination and ensure maintenance of proper data	Y		
d. If continuous monitoring, indicates averaging time and how instruments should store and maintain raw data, or data averages	Y		
e. Indicates how samples are to be homogenized, composited, split, or filtered, if needed	Y		
f. Indicates what sample containers and sample volumes should be used	Y		
g. Identifies whether samples should be preserved and indicates methods that should be followed	Y		
h. Indicates whether sampling equipment and samplers should be cleaned and/or decontaminated, identifying how this should be done and by-products disposed of	Y	Section 4.4	
i. Identifies any equipment and support facilities needed	Y	Section 4.6	
j. Addresses actions to be taken when problems occur, identifying individual(s) responsible for corrective action and how this should be documented	Y	Section 8.1.1	
B3. Sample Handling and Custody			
a. States maximum holding times allowed from sample collection to extraction and/or analysis for each sample type and, for in-situ or continuous monitoring, the maximum time before retrieval of information	Y	Section 4.7.5	

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
b. Identifies how samples or information should be physically handled, transported, and then received and held in the laboratory or office (including temperature upon receipt)	Y	Field – Section 4.7.4 Analytical Laboratory – Section 5.4 Troy SPF – Section 5.4	
c. Indicates how sample or information handling and custody information should be documented, such as in field notebooks and forms, identifying individual responsible	Y	Field – Section 4.7.1 Analytical Laboratory – Section 5.4 Troy SPF – Section 5.4	
d. Discusses system for identifying samples, for example, numbering system, sample tags and labels, and attaches forms to the plan	Y	Section 4.7.1, Section 5.4	
e. Identifies chain-of-custody procedures and includes form to track custody	Y	Field – Section 4.7.2 to 4.7.3 Analytical Laboratory – Section 5.4 Troy SPF – Section 5.4	
B4. Analytical Methods			
a. Identifies all analytical SOPs (field, laboratory and/or office) that should be followed by number, date, and regulatory citation, indicating options or modifications to be taken, such as sub-sampling and extraction procedures	Y	Section 5.1, Appendix A Soil– Section 5.1 to 5.2	
b. Identifies equipment or instrumentation needed	Y		
c. Specifies any specific method performance criteria	Y		
d. Identifies procedures to follow when failures occur, identifying individual responsible for corrective action and appropriate documentation	Y		
e. Identifies sample disposal procedures	Y	Section 5.5	
f. Specifies laboratory turnaround times needed	Y	Section 5.3	
g. Provides method validation information and SOPs for nonstandard methods	Y	Appendix A	
B5. Quality Control			

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
a. For each type of sampling, analysis, or measurement technique, identifies QC activities which should be used, for example, blanks, spikes, duplicates, etc., and at what frequency	Y	Section 6 Field – Section 6.1 Analytical Laboratory – Section 6.3 Troy SPF – Section 6.2	
b. Details what should be done when control limits are exceeded, and how effectiveness of control actions will be determined and documented	Y		
c. Identifies procedures and formulas for calculating applicable QC statistics, for example, for precision, bias, outliers and missing data	Y		
B6. Instrument/Equipment Testing, Inspection, and Maintenance			
a. Identifies field and laboratory equipment needing periodic maintenance, and the schedule for this	Y	Field – Section 6.4.1 Analytical Laboratory –Section 6.3.1, Section 6.4.3 Troy SPF – Section 6.4.2	
b. Identifies testing criteria	Y		
c. Notes availability and location of spare parts	Y		
d. Indicates procedures in place for inspecting equipment before usage	Y		
e. Identifies individual(s) responsible for testing, inspection and maintenance	Y		
f. Indicates how deficiencies found should be resolved, re-inspections performed, and effectiveness of corrective action determined and documented	Y		
B7. Instrument/Equipment Calibration and Frequency			
a. Identifies equipment, tools, and instruments that should be calibrated and the frequency for this calibration	Y	Field – Section 4.4.2, Section 6.4.1 Analytical Laboratory – Section 6.3.1, Section 6.4.3 Troy SPF – Section 6.4.2	
b. Describes how calibrations should be performed and documented, indicating test criteria and standards or certified equipment	Y		
c. Identifies how deficiencies should be resolved and documented	Y		
B8. Inspection/Acceptance for Supplies and Consumables			

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
a. Identifies critical supplies and consumables for field and laboratory, noting supply source, acceptance criteria, and procedures for tracking, storing and retrieving these materials	Y	Field – Section 6.5.1 Analytical Laboratory – Section 6.5.2 Troy SPF – Section 6.5.2	
b. Identifies the individual(s) responsible for this	Y		
B9. Non-direct Measurements			
a. Identifies data sources, for example, computer databases or literature files, or models that should be accessed and used	NA	---	
b. Describes the intended use of this information and the rationale for their selection, i.e., its relevance to project	NA	---	
c. Indicates the acceptance criteria for these data sources and/or models	NA	---	
d. Identifies key resources/support facilities needed	NA	---	
e. Describes how limits to validity and operating conditions should be determined, for example, internal checks of the program and Beta testing	NA	---	
B10. Data Management			
a. Describes data management scheme from field to final use and storage	Y	Section 7 Section 7.1 to 7.4 Field – Section 7.1.1 Analytical Laboratory – Section 7.1.3 Troy SPF – Section 7.1.2	
b. Discusses standard record-keeping and tracking practices, and the document control system or cites other written documentation such as SOPs	Y		
c. Identifies data handling equipment/procedures that should be used to process, compile, analyze, and transmit data reliably and accurately	Y		
d. Identifies individual(s) responsible for this	Y		
e. Describes the process for data archival and retrieval	Y		
f. Describes procedures to demonstrate acceptability of hardware and software configurations	Y		
g. Attaches checklists and forms that should be used	Y		
C1. Assessments and Response Actions			

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
a. Lists the number, frequency, and type of assessment activities that should be conducted, with the approximate dates	Y	Section 8 Field – Section 8.1.1 Analytical Laboratory – Section 8.1.3 Troy SPF – Section 8.1.2	
b. Identifies individual(s) responsible for conducting assessments, indicating their authority to issue stop work orders, and any other possible participants in the assessment process	Y		
c. Describes how and to whom assessment information should be reported	Y		
d. Identifies how corrective actions should be addressed and by whom, and how they should be verified and documented	Y		
C2. Reports to Management			
a. Identifies what project QA status reports are needed and how frequently	Y	Section 8.3, Section 9.1.4	
b. Identifies who should write these reports and who should receive this information	Y		
D1. Data Review, Verification, and Validation			
Describes criteria that should be used for accepting, rejecting, or qualifying project data	Y	Section 9.1	
D2. Verification and Validation Methods			
a. Describes process for data verification and validation, providing SOPs and indicating what data validation software should be used, if any	Y	Section 9.1.3 to 9.1.4	
b. Identifies who is responsible for verifying and validating different components of the project data/information, for example, chain-of-custody forms, receipt logs, calibration information, etc.	Y		
c. Identifies issue resolution process, and method and individual responsible for conveying these results to data users	Y		
d. Attaches checklists, forms, and calculations	Y	Appendix A; verification SOPs	
D3. Reconciliation with User Requirements			

Element	Acceptable *Yes/No/NA*	Page/ Section	Comments
a. Describes procedures to evaluate the uncertainty of the validated data	Y	Section 9.2	
b. Describes how limitations on data use should be reported to the data users	Y		

ASBESTOS LABORATORY ACCEPTANCE CRITERIA
FOR LIBBY ASBESTOS SUPERFUND SITE

MINIMUM LABORATORY ACCEPTANCE CRITERIA

1. Must be certified by the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) for the analysis of asbestos by PLM[1] and/or TEM[2].

2. Must have a laboratory-specific Quality Management Plan and all relevant SOPs in place for asbestos environmental sample processing and analysis.

3. Must have multiple experienced analysts on staff capable of running PLM visual area estimation methods [NIOSH 9002, EPA 600] and/or TEM methods [ISO 10312, ISO 13794, AHERA, ASTM 5755, EPA Method 100.2] (a minimum of 2 analysts within each laboratory are needed to assess within-laboratory reproducibility). Must have documentation in place demonstrating all analysts work experience and training related to analyses performed.

4. Must be familiar with standard TEM and PLM preparation methods. TEM laboratories must have ability to perform indirect preparation and ashing (for the analysis of air, dust, other media) and/or ozonation/UV/sonication treatment (for the analysis water). PLM laboratories must have the ability to dry samples (for PLM-NIOSH 9002 analysis). If the PLM laboratory wishes to perform soil sample preparation in support of the Libby-specific PLM methods (i.e., PLM-VE and PLM-Grav), the laboratory must have the ability to sieve and grind soil samples in accordance with the Libby-specific preparation method.

> Note: Not all laboratory facilities need to have all preparation capabilities; media analysis could be segregated based on facility capability (i.e. one laboratory does water, another does soil, etc.).

5. TEM laboratories must have Energy Dispersive Spectroscopy (EDS) and Selected Area Electron Diffraction (SAED) capability incorporated into their microscope(s).

6. Must participate in monthly EPA laboratory calls for the Libby project.

7. Must participate in inter-laboratory analyses with other Libby project laboratories.

8. Must participate in annual EPA (QATS) audits and in other laboratory and/or data audits if data quality issues arise, as deemed appropriate by EPA.

9. Must be capable of using Libby-specific bench sheets to record observations and utilizing Libby-specific electronic data deliverables (EDDs) to report analytical results.

10. Must have the capacity to meet the required delivery schedules and turn-around times.

11. Must designate laboratory primary and secondary points of contact for discussion of EPA/laboratory issues.

EPA APPROVAL PROCESS

1. Once potential laboratories are identified that meet the minimum acceptance criteria, they must show proficiency in analysis of NIST/NVLAP performance evaluation samples and inter-laboratory samples

---

[1] http://www.nist.gov/nvlap/upload/NIST-HB-150-3-2006-1.pdf
[2] http://www.nist.gov/nvlap/upload/NIST-HB-150-13-2006-1.pdf

(standard PLM visual area estimation and TEM only, no Libby-specific method modifications and requirements).

2. If proficiency is documented, an EPA (QATS) audit will be performed.

3. If any deficiencies found during the audit are sufficiently resolved to EPA's satisfaction, then project-specific mentoring will be conducted to ensure laboratories are proficient in the Libby-specific methods, modifications, and requirements.

4. Once a laboratory has passed all of these steps, EPA will approve the use of the laboratory and documentation to this effect will be sent to the laboratory. Samples can then be sent to the laboratory for analysis.