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All sediment samples will be analyzed for asbestos, metals/metalloids, and petroleum hydrocarbons, anions, total organic carbon, and other sediment quality parameters. Sediments from lower Rainy Creek (LRC-1 to LRC-6) and the tailings impoundment toe drain (TP-TOE2) will be analyzed for PCBs to assess the potential effects of use of oil for dust control along the adjacent road. Sediment collected from TP-TOE2 and LRC-2 will also be analyzed for pesticides, herbicides, VOCs, SVOCs, and cyanide. Details on the specific analyses that will be performed for sediment are discussed in Section 6.

5.1.2 Element 2: Spring Runoff Monitoring

The purpose of Element 2 is to monitor stream flow and surface water asbestos concentration values at selected stations within the Rainy Creek watershed during the rising and falling limbs of the spring-season snowmelt-runoff hydrograph. These data will be used as part of the data set to evaluate exposure and risk to human and ecological receptors from LA, as well as to track changes in the asbestos loading and transport in surface water as stream flows first rise in response to snowmelt runoff and then decline as snowmelt ends.

Surface water samples will be collected once during winter base-flow conditions, and then weekly beginning at the onset of rising stream flows in response to snowmelt, continuing through the spring high-flow season, and ending approximately 4 weeks after the seasonal peak in flow is observed on Rainy Creek. Table 5-3 and Figure 5-3 identify the locations where samples of surface water will be collected under Element 2. Surface water samples will be collected weekly during the spring runoff season at the following locations:

- Tailings impoundment (TP*), impoundment toe drain (TP-TOE1), and impoundment overflow (TP-Overflow)
- Mill Pond (MP*)
- Rainy Creek upstream of the mine-disturbed areas (URC-1A, URC-2*)
- Fleetwood Creek (FC-2) and Carney Creek (CC-2) downstream of mine-disturbed areas
- Lower Rainy Creek below the Mill Pond (LRC-1) and below Carney Creek (LRC-2, LRC-6)
- Ponds on Carney Creek (CC-Pond) and Fleetwood Creek[2] (FC-Pond*)

Stations designated with "*" above are the locations where rapid turn-around of asbestos analysis is necessary to support selection of the appropriate location for surface water toxicity testing. All of the locations listed were sampled during the Phase I investigation except for one new station on upper Rainy Creek (URC-1A) and one new station at a pond along lower Carney Creek (CC-Pond). All but two of the locations selected for Element 2 are downstream of potential primary sources of asbestos, including mine waste piles and the coarse and fine tailings disposal areas,

[2] Weekly monitoring at FC-Pond will be suspended following selection of the water toxicity test location.

All method-specific quality control measures, such as external and internal standard calibration procedures, instrument performance verifications, and quantitation using method of standard additions, specified within any referenced EPA method number will be performed.

6.2.1 Water

Non-asbestos analyses required for surface water samples are listed in Table 6-1. Analytes included under each method are identified in Table 3-1. All surface water samples will be analyzed for total EPH. If the total EPH concentration is greater than 300 ug/L, the water sample will be analyzed for specific EPH compounds (C9-C18 aliphatics, C19-C36 aliphatics, and C11-C22 aromatics) and PAHs[3].

6.2.2 Sediment

Non-asbestos analyses required for sediment samples are listed in Table 6-2. Analytes included under each method are identified in Table 3-3. All sediment samples will be analyzed for total EPH. If the total EPH concentration is greater than 50 mg/kg, the sediment sample will be analyzed for the specific EPH compounds and PAHs identified in Section 6.2.1 above.

6.3 Instrument Calibration and Frequency

All laboratory instruments used in the analysis of samples generated during this project must be calibrated by the laboratory in accordance with the requirements of the instrument manufacturer and the requirements specified in the relevant analytical method. Calibration records will be kept in logbooks for all instruments. It is the responsibility of the Laboratory Quality Assurance (QA) Officer to assure that calibration data is properly logged in the logbooks for each analysis.

6.4 Laboratory Custody Procedures and Documentation

The laboratories will implement the following procedures:

- A sample custodian will be designated.
- Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipping container and the individual samples.
- Enclosed chain-of-custody records will be cross-referenced with all the samples in the shipment. These records will be signed by the sample custodian and placed in the project file.
- Sample storage will be secured (in the appropriate environment, i.e., refrigerated, dry, etc.), sample storage records and intra-laboratory sample custody records will be maintained, and sample disposal and disposal date will be properly documented.
- Internal chain-of-custody procedures will be followed by assigning a unique laboratory number to each sample on receipt; this number identifies the sample through all further handling;
- Internal logbooks and records will maintain the chain-of-custody throughout sample preparation and analysis, and data reporting will be kept in the project files.
- The original chain-of-custody record will be returned to the Project QA Officer with the resulting data report from the laboratory.

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[3] PAH analyte list: Acenaphthene · Anthracene · Benz(a)anthracene · Benzo(a)pyrene · Benzo(b)fluoranthene · Benzo(k)fluoranthene · Chrysene · Dibenzo(a,h)anthracene · Fluoranthene · Fluorene · Indeno(1,2,3-cd)pyrene · Naphthalene · Pyrene

8.2 Laboratory-Based Quality Control Samples for Asbestos Analysis by TEM

The QC requirements for TEM analyses of water samples at the Libby site are patterned after the requirements set forth by NVLAP. There are three types of laboratory-based QC analyses that are performed for TEM. Each of these is described in more detail below.

Lab Blank - This is an analysis of a TEM grid that is prepared from a new, unused filter by the laboratory and is analyzed using the same procedure as used for field samples.

Recounts - A recount is an analysis where TEM grid openings are re-examined after the initial examination. The type of recount depends upon who is performing the re-examination. A *Recount Same* (RS) describes a re-examination by the same microscopist who performed the initial examination. A *Recount Different* (RD) describes a re-examination by a different microscopist within the same laboratory than who performed the initial examination. An *Interlab* (IL) describes a re-examination by a different microscopist from a different laboratory.

Repreparation - A repreparation is an analysis of a TEM grid that is prepared from a new aliquot of the same field sample as was used to prepare the original grid. Typically, this is done within the same lab as did the original analysis, but a different lab may also prepare grids from a new piece of filter.

As described the most recent Libby-specific Laboratory Modification #29 (LB-000029), laboratory blanks will be performed at a frequency of 4%, recounts will be performed at a frequency of 0.5% - 2.5% (depending upon the type of recount), and repreparations will be performed at a frequency of 1%. LB-000029 summarizes the project-specific acceptance criteria for TEM QC analyses for all participating laboratories.

For the purposes of the OU3 investigations, laboratory QC sample frequency requirements should be applied on a project-specific and medium-specific basis, rather than "across all media" as specified in LB-000029. Table 8-3 (Panel A) presents a summary of the number of expected laboratory QC samples for TEM analysis for the Phase IIA sampling program.

8.3 Laboratory-Based Quality Control Samples for Asbestos Analysis by PLM

8.3.1 Preparation Laboratory QC Samples

Sediment preparation QC samples are collected to ensure proper sample handling and decontamination of sediment preparation equipment. Preparation QC samples are assigned unique field identifiers and are submitted blind to the analytical laboratory along with the field samples. Thus, the analytical laboratories cannot distinguish field samples from preparation QC

Table 5-4. Sample Containers, Preservation and Handling Requirements, and Holding Times for Sediment Samples

Container Description	Analyses	Method	Preservation and Handling	Extraction/Analysis Holding Times
8-oz glass jar	TAL Metals + Boron	EPA 6010B/6020	Cool 4°C	180 days
	Mercury	EPA 7471A	Cool 4°C	28 days
	Total organic carbon (TOC)	LECO	Cool 4°C protect from sunlight and atmospheric oxygen	28 days
	Percent solids	SM 2540	Cool 4°C	180 days
	Paste pH	EPA 9045D/ ASAM10-3.2	Cool 4°C	14 days
	Fluoride and total phosphorus	EPA 300.0/ SM4500-F-C EPA 365.1	Cool 4°C	14 days (F) 28 days (P)
	Cyanide	EPA 9012	Cool 4°C	14 days
40-mL glass vial with Teflon-lined crew cap (pre-preserved with methanol)	Volatile Petroleum Hydrocarbons	MADEP-VPH-04-1.1	Cool 4°C	28 days
4-oz wide-mouth amber glass jar with Teflon-lined screw cap	Extractable Petroleum Hydrocarbons	SW8015M (c) MA-DEP-EPH-04-1	Cool 4°C	14 days
4-oz glass jar	Organophosphate Pesticides	EPA 8141	Cool 4°C	14 days/40 days
8-oz glass jar	Chlorinated Pesticides	EPA 8081	Cool 4°C	14 days/40 days
	Herbicides	EPA 8151	Cool 4°C	14 days/40 days
	Polychlorinated Biphenyls (PCBs)	EPA 8082	Cool 4°C	14 days/40 days
40-mL glass vial with Teflon-lined crew cap (pre-preserved with methanol)	Volatile Organic Compounds (VOCs) (a)	EPA 8260B	Cool 4°C	14 days
4-oz amber glass jar with Teflon-lined screw cap	Semi-volatile Organic Compounds (SVOCs) (a)	EPA 8270C	Cool 4°C	14 days/40 days
500 g in Ziploc bag (soil) or plastic jar (sediment)	Asbestos	PLM-Grav: SRC-LIBBY-01 (Rev. 2) PLM-VE: SRC-LIBBY-03 (Rev. 2)	None	None
8-oz glass jar	*[Archive sample]*		Cool 4°C	--

(a) CLP analyte list

(b) with Libby-specific modifications

(c) SW8015M will be used as a screening method to determine if more detailed analysis by MA-DEP EPH is needed

Table 5-5. Sample Containers, Preservation and Handling Requirements, and Holding Times for Aqueous Sample Matrices

Container Description	Analyses	Method	Preservation and Handling	Extraction/ Analysis Holding Times
250-mL plastic (pre-preserved with HNO_3)	TAL Metals+Boron (Total)	6010B/6020 and EPA 200 series methods (a)	Cool 4°C; HNO_3, pH<2	180 days
	Mercury	7470A/ EPA 245.1	Cool 4°C	28 days
250-mL plastic filtration container	TAL Metals+Boron (Dissolved), Hardness	6010B/6020 and EPA 200 series methods (a)	Cool 4°C; HNO_3 (preserve sample in field after filtering)	180 days
500-mL amber glass	Dissolved Organic Carbon (DOC)	A5310C	Cool 4°C; H_3PO_4 (preserve sample in field after filtering)	28 days
500-mL plastic (pre-preserved with H_2SO_4)	Nitrate, Ammonia, Total Kjeldahl Nitrogen (TKN)	EPA 353.2, 350.1/350.2, 351.2	Cool 4°C; H_2SO_4, pH<2	28 days
	Orthophosphate	EPA 365.1	Cool 4°C; H_2SO_4, pH<2	28 days
3 x 40-mL amber glass vial with Teflon-lined screw cap (pre-preserved with HCl)	Volatile Petroleum Hydrocarbons (VPH)	MA-DEP VPH modified	HCl to pH <2 Cool 4°C	14 days
2 x 1-L amber glass bottle with Teflon-lined screw cap (pre-preserved with H_2SO_4)	Extractable Petroleum Hydrocarbons (EPH)	SW8015M (e) MA-DEP EPH modified	H_2SO_4 to pH <2, Cool 4°C	14 days/40 days
1-L plastic	Fluoride/Chloride/Sulfate	EPA 300.0	Cool 4°C	28 days
	Total Suspended Solids (TSS)	Standard Methods 2540D	Cool 4°C	7 days
	Nitrite	EPA 353.2	Cool 4°C	48 hours
	Total Dissolved Solids (TDS)	Standard Methods 2540C,D	Cool 4°C	7 days
	Alkalinity	Standard Methods 2320B	Cool 4°C	14 days
2 x 1-L amber glass	Organophosphate Pesticides	EPA 8141	Cool 4°C	7 days/40 days
2 x 1-L amber glass	Chlorinated Pesticides	EPA 8081	Cool 4°C	7 days/40 days
	Polychlorinated Biphenyls (PCBs)	EPA 8082	Cool 4°C	7 days/40 days
2 x 1-L amber glass	Herbicides	EPA 8151	Cool 4°C	7 days/40 days
2 x 1-L amber glass (b)	Semi-volatile Organic Compounds (SVOCs) (c)	EPA 8270C	Cool 4°C	7 days/40 days
3 x 40 mL vials; no headspace (pre-preserved with HCl)	Volatile Organic Compounds (VOCs) (c)	EPA 8260B	Cool 4°C; HCl pH<2	14 days
1-L plastic (pre-preserved with HNO_3)	Radiochemistry (gross alpha and gross beta)	EPA 900.0	Cool 4°C; HNO_3	None
500-mL plastic(pre-preserved with NaOH)	Cyanide	Kelada mod.	Cool 4°C; NaOH, pH>12	14 days
1 L HDPE container	Asbestos	ISO 10312 (d)	Cool 4°C	Filtered within 48 hours

(a) 200 series methods: 200.7, 200.8
(b) 2 additional 1-L amber glass containers will be needed for MS/MSD
(c) CLP analyte list
(d) with Libby-specific modifications
(e) SW8015M will be used as a screening method to determine if more detailed analysis by MA-DEP EPH is needed

Table 6-1. List of Non-Asbestos Analyses Required for Surface Water for Element 1 (Spring, Summer)

Reach	Station	Standard Analyses (performed for all samples)																Additional Analyses (performed for subset of samples)							
		Cations			Pertroleum Hydrocarbons			Nitrogen Compounds				Water quality parameters				Anions		Cyanide	Pesticides		Herbicides	PCBs	VOCs	SVOCs/ PAHs	Radionuclides
		TAL Metals		Hg	Extractable HC		Volatile HC	NH_4	Total N	NO_2+NO_3	NO_2	HCO_3,CO_3	TSS	TDS	DOC	Cl, F, SO_4	PO_4								Gross α, β
		SW6020	SW6010B	SW7470A	MA-EPH	SW8015M	MA-VPH	E350 1	E351 2	E353 2	E353 2	A2320 B	A2540D	A2540C,D	A5310C	E300 0	E365 1	Kelada mod	SW8081A	SW8141A	SW8151A	SW8082	SW8260B	SW8270C	E900 0
Upper Rainy Creek	URC-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	URC-1A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	URC-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Tailings impoundment	TP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	UTP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	TP-TOE1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TP-TOE2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	TP-Overflow	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Mill pond	MP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Lower Rainy Creek	LRC-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	LRC-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	LRC-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	LRC-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	LRC-5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	LRC-6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Fleetwood Creek	FC-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	FC-Pond	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	FC-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Carney Creek	CC-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CC-Pond	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CC-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Seeps	CCS-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
	CCS-16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								

x = Sample(s) to be analyzed

Table 6-2. List of Non-Asbestos Analyses Required for Sediment in Element 1 (Spring and Summer)

Reach	Station	Standard Analyses (performed for all samples)											Additional Analyses (performed for a subset of samples)						
		Cations			Petroleum Hydrocarbons			Anions		Sediment quality parameters			PCBs	Cyanide	Pesticides		Herbicides	VOCs	SVOCs/ PAHs
		TAL Metals		Hg	Extractable HC		Volatile HC	Fluoride	Phosphorus	Paste pH	% Solids	TOC							
		SW6020	SW6010B	SW7471A	MA-EPH	SW8015M	MA-VPH	E300.0	E365.1	ASAM10-3.2	SM2540	Leco	SW8082	SW9012	SW8081A	SW8141A	SW8151A	SW8260B	SW8270C
Upper Rainy Creek	URC-1	X	X	X	X	X	X	X	X	X	X	X							
	URC-1A	X	X	X	X	X	X	X	X	X	X	X							
	URC-2	X	X	X	X	X	X	X	X	X	X	X							
Tailings impoundment	TP/UTP	X	X	X	X	X	X	X	X	X	X	X							
	TP-TOE1	X	X	X	X	X	X	X	X	X	X	X							
	TP-TOE2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TP-Overflow	X	X	X	X	X	X	X	X	X	X	X							
Mill pond	MP	X	X	X	X	X	X	X	X	X	X	X							
Lower Rainy Creek	LRC-1	X	X	X	X	X	X	X	X	X	X	X	X						
	LRC-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	LRC-3	X	X	X	X	X	X	X	X	X	X	X	X						
	LRC-4	X	X	X	X	X	X	X	X	X	X	X	X						
	LRC-5	X	X	X	X	X	X	X	X	X	X	X	X						
	LRC-6	X	X	X	X	X	X	X	X	X	X	X	X						
Fleetwood Creek	FC-1	X	X	X	X	X	X	X	X	X	X	X							
	FC-Pond	X	X	X	X	X	X	X	X	X	X	X							
	FC-2	X	X	X	X	X	X	X	X	X	X	X							
Carney Creek	CC-1	X	X	X	X	X	X	X	X	X	X	X							
	CC-Pond	X	X	X	X	X	X	X	X	X	X	X							
	CC-2	X	X	X	X	X	X	X	X	X	X	X							
Seeps	CCS-1	X	X	X	X	X	X	X	X	X	X	X							
	CCS-6	X	X	X	X	X	X	X	X	X	X	X							
	CCS-8	X	X	X	X	X	X	X	X	X	X	X							
	CCS-9	X	X	X	X	X	X	X	X	X	X	X							
	CCS-11	X	X	X	X	X	X	X	X	X	X	X							
	CCS-14	X	X	X	X	X	X	X	X	X	X	X							
	CCS-16	X	X	X	X	X	X	X	X	X	X	X							

x = Sample(s) to be analyzed