Table 3-1. Phase I Analytical Methods for Surface Water

Category	Method	Analytes			
Metals	SW6020 & SW 6010B	Aluminum	Beryllium	Copper	Selenium
		Antimony	Cadmium	Lead	Silver
		Arsenic	Chromium	Manganese	Thallium
		Barium	Cobalt	Nickel	Vanadium
		Boron	Iron	Potassium	Zinc
		Calcium	Magnesium	Sodium	
	SW7470A	Mercury			
Pesticides	SW8081A	4,4´-DDD	beta-BHC	Endosulfan sulfate	Heptachlor
		4,4´-DDE	Chlordane	Endrin	Heptachlor epoxide
		4,4´-DDT	delta-BHC	Endrin aldehyde	Isodrin
		Aldrin	Dieldrin	Endrin ketone	Methoxychlor
		alpha-BHC	Endosulfan I	gamma-BHC (Lindane)	Toxaphene
		alpha-Chlordane	Endosulfan II	gamma-Chlordane	
	SW8151A	2,4,5-T	Dalapon	MCPA	
		2,4,5-TP (Silvex)	Dicamba	MCPP	
		2,4-D	Dichlorprop	Pentachlorophenol	
Organophosphorus Pesticides	8141A	Dichlorvos	Diazinon	Chlorpyrifos	Stirophos (Tetrachlorovinphos)
		Mevinphos	Disulfoton	Trichloronate	Bolstar (Sulprofos)
		Demeton-O,S	Dimethoate	Methyl Parathion	Fensulfothion
		Ethoprop (Prophos)	Ronnel	Mathion	EPN
		Phorate	Merphos	Tokuthion (Prothiofos)	Azinphos-methyl (Guthion)
		Sulfotep	Fenthion	Ethyl Parathion	Coumaphos
PCBs	SW8082	Aroclor 1016	Aroclor 1242	Aroclor 1260	
		Aroclor 1221	Aroclor 1248	Aroclor 1262	
		Aroclor 1232	Aroclor 1254	Aroclor 1268	
VOCs	SW8260B	1,1,1-Trichloroethane	1,3-Dichlorobenzene	Chlorodibromomethane	Methyl isobutyl ketone
		1,1,2,2-Tetrachloroethane	1,4-Dichlorobenzene	Chloroethane	Methyl tert-butyl ether (MTBE)
		1,1,2-Trichloro-1,2,2-trifluoroethane	1,4-Dioxane	Chloroform	Methylcyclohexane
		1,1,2-Trichloroethane	2-Hexanone	Chloromethane	Methylene chloride
		1,1-Dichloroethane	Acetone	cis-1,2-Dichloroethene	o-Xylene
		1,1-Dichloroethene	Benzene	cis-1,3-Dichloropropene	Styrene
		1,2,3-Trichlorobenzene	Bromochloromethane	Cyclohexane	Tetrachloroethene
		1,2,4-Trichlorobenzene	Bromodichloromethane	Dichlorodifluoromethane	Toluene
		1,2-Dibromo-3-chloropropane	Bromoform	Ethylbenzene	trans-1,2-Dichloroethene
		1,2-Dibromoethane	Bromomethane	Isopropylbenzene	trans-1,3-Dichloropropene
		1,2-Dichlorobenzene	Carbon disulfide	m+p-Xylenes	Trichloroethene
		1,2-Dichloroethane	Carbon tetrachloride	Methyl acetate	Trichlorofluoromethane
		1,2-Dichloropropane	Chlorobenzene	Methyl ethyl ketone	Vinyl chloride
SVOCs	SW8270C	1,2,4,5-Tetrachlorobenzene	3,3´-Dichlorobenzidine	bis(-2-chloroethyl)Ether	Hexachlorocyclopentadiene
		2,3,4,6-Tetrachlorophenol	3-Nitroaniline	bis(2-chloroisopropyl)Ether	Hexachloroethane
		2,4,5-Trichlorophenol	4,6-Dinitro-2-methylphenol	bis(2-ethylhexyl)Phthalate	m+p-Cresols
		2,4,6-Trichlorophenol	4-Bromophenyl phenyl ether	Butylbenzylphthalate	Nitrobenzene
		2,4-Dichlorophenol	4-Chloro-3-methylphenol	Caprolactam	n-Nitroso-di-n-propylamine
		2,4-Dimethylphenol	4-Chlorophenyl phenyl ether	Carbazole	n-Nitrosodiphenylamine
		2,4-Dinitrophenol	4-Nitroaniline	Dibenzofuran	o-Cresol
		2,4-Dinitrotoluene	4-Nitrophenol	Diethyl phthalate	p-Chloroaniline
		2,6-Dinitrotoluene	Acetophenone	Dimethyl phthalate	Pentachlorophenol
		2-Chloronaphthalene	Atrazine	Di-n-butyl phthalate	Phenol
		2-Chlorophenol	Benzaldehyde	Di-n-octyl phthalate	
		2-Nitroaniline	Biphenyl	Hexachlorobenzene	
		2-Nitrophenol	bis(-2-chloroethoxy)Methane	Hexachlorobutadiene	
PAHs	SW8270C	2-Methylnaphthalene	Benzo(a)pyrene	Dibenzo(a,h)anthracene	Naphthalene
		Acenaphthene	Benzo(b)fluoranthene	Fluoranthene	Phenanthrene
		Acenaphthylene	Benzo(g,h,i)perylene	Fluorene	Pyrene
		Anthracene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	
		Benzo(a)anthracene	Chrysene	Isophorone	
Extractable hydrocarbons	MA-EPH	C11 to C22 Aromatics	C9 to C18 Aliphatics		
		C19 to C36 Aliphatics	Total Extractable Hydrocarbons		
	SW8015M	Total Extractable Hydrocarbons			
Volatile hydrocarbons	MA-VPH	C5 to C8 Aliphatics	Benzene	Methyl tert-butyl ether (MTBE)	
		C9 to C10 Aromatics	Ethylbenzene	Naphthalene	
		C9 to C12 Aliphatics	Toluene	m+p-Xylenes	
		Total Purgeable Hydrocarbons	Xylenes, Total	o-Xylene	
Nitrogen cmpds	E350.1	Nitrogen, Ammonia as N			
	E351.2	Nitrogen, Kjeldahl, Total as N			
	E353.2	Nitrogen, Nitrate+Nitrite as N			
	E353.2	Nitrogen, Nitrite as N	Nitrogen, Nitrate as N		
Radionuclides	E900.0	Gross Alpha			
	E903.0	Radium 226			
	RA-05	Radium 228			
	A7500-RA	Radium 226 + Radium 228			
Anions	E300.0	Chloride	Fluoride	Sulfate	
	E365.1	Orthophosphate as P			
	Kelada mod	Cyanide, Total			
Water quality parameters	A2320 B	Alkalinity, Total as CaCO3			
		Bicarbonate as HCO3			
		Carbonate as CO3			
		Hardness as CaCO3			
	A2540 C,D	Solids, Total Dissolved TDS	Solids, Total Suspended		
	A5310 C	Organic Carbon, Dissolved (DOC)			

Table 3-2. List of Phase I Surface Water Stations and Analyses

		Asbestos (LA)	Cations			Pesticides			PCBs	VOCs	SVOCs	PAHs	Pertroleum Hydrocarbons			Nitrogen Compunds				Radionuclides				Anions			Water quality parameters		
			TAL Metals		Hg								Extractable HC		Volatile HC	NH4	Total N	N02+NO3	NO2	Gross α	Ra226	Ra228	Ra226+228	Cl, F, SO4	PO4	CN	HCO3,CO3	TDS	DOC
Reach	Station	EPA 100.2	SW6020	SW6010B	SW7470A	SW8081A	SW8151A	8141A	SW8082	SW8260B	SW8270C	SW8270C	MA-EPH	SW8015M	MA-VPH	E350.1	E351.2	E353.2	E353.2	E900.0	E903.0	RA-05	A7500-RA	E300.0	E365.1	Kelada	A2320 B	A2540C,D	A5310 C
Upper Rainy Creek	URC-1	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
Tailings impoundment	TP	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	X	X
	TP-TOE2	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
Lower Rainy Creek	LRC-1	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	X	X	X
	LRC-3	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
	LRC-5	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	
Fleetwood Creek	FC-1	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	X
	FC-2	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
	CC-2	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
	CCS-6	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
	CCS-9	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
	CCS-14	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= Sample analyzed

Table 3-3. Phase I Asbestos Results for Surface Water

Reach	Station	Sensitivity 1E-06/L	Total LA (MFL)				LA > 10 um in Length (MFL)			
			LA Count	Best Estimate	95% Conf. Bounds		LA Count	Best Estimate	95% Conf. Bounds	
Upper Rainy Creek	URC-1	0.05	0	<0.1	0.0	0.1	0	<0.05	0.0	0.1
	URC-2	0.11	52	5.8	4.3	7.5	1	0.1	0.0	0.5
Tailings Impoundment	TP	1.99	57	114	86.9	146.0	19	38	23.6	57.9
	TP-TOE1	0.05	0	<0.1	0.0	0.1	0	<0.05	0.0	0.1
	TP-TOE2	0.20	10	2.0	1.0	3.5	6	1.2	0.5	2.5
Mill Pond	MP	0.50	54	27	20.4	34.8	20	10	6.3	15.1
Lower Rainy Creek	LRC-1	0.05	4	0.2	0.1	0.5	0	<0.05	0.0	0.1
	LRC-2	0.05	2	0.1	0.0	0.3	1	0.05	0.0	0.2
	LRC-3	0.05	4	0.2	0.1	0.5	0	<0.05	0.0	0.1
	LRC-4	0.05	21	1.0	0.7	1.6	3	0.2	0.0	0.4
	LRC-5	0.05	25	1.2	0.8	1.8	2	0.1	0.0	0.3
	LRC-6	0.05	0	<0.1	0.0	0.1	0	<0.05	0.0	0.1
Fleetwood Creek	FC-1	0.08	51	3.9	2.9	5.1	12	0.9	0.5	1.6
	FC-Pond	2.49	50	125	93.5	162.7	3	7.5	2.1	19.9
	FC-2	0.05	4	0.2	0.1	0.5	1	0.05	0.0	0.2
Carney Creek	CC-1	0.05	20	0.9	0.6	1.4	7	0.3	0.1	0.7
	CC-2	0.05	1	0.00	0.0	0.2	1	0.05	0.0	0.2
Seeps	CCS-9	0.05	0	<0.1	0.0	0.1	0	<0.05	0.0	0.1
	CCS-8	0.05	0	<0.1	0.0	0.1	0	<0.05	0.0	0.1
	CCS-6	1.99	50	100	74.8	130.2	2	4.0	0.8	12.8
	CCS-1	0.14	53	7.5	5.7	9.8	3	0.4	0.1	1.1
	CCS-11	0.33	50	17	12.5	21.7	10	3.3	1.7	5.9
	CCS-14	0.20	55	11	8.3	14.2	0	<0.2	0.0	0.5
	CCS-16	0.08	0	<0.1	0.0	0.2	0	<0.08	0.0	0.2

Table 3-4. Phase I Non-Asbestos Results for Surface Water

Category	Detected Analytes	Units	Detection Frequency (DF)	Mean Detection Limit (DL)	Concentration	
					Mean[1]	Max
Metals[†]	Barium	mg/L	24 / 24 100%	na	0.5	1
	Copper	mg/L	1 / 24 4%	0.002	0.001	0.004
	Iron	mg/L	3 / 24 13%	0.03	0.07	1.3
	Manganese	mg/L	5 / 24 21%	0.02	0.05	0.7
	Vanadium	mg/L	1 / 24 4%	0.01	0.005	0.01
	Calcium	mg/L	24 / 24 100%	na	82	131
	Magnesium	mg/L	24 / 24 100%	na	24	49
	Potassium	mg/L	24 / 24 100%	na	13	33
	Sodium	mg/L	24 / 24 100%	na	8	15
Volatile Hydrocarbons	Benzene	ug/L	1 / 24 4%	0.5	0.3	0.7
	C5 to C8 Aliphatics	ug/L	3 / 24 13%	20	14	62
	TPH	ug/L	3 / 24 13%	20	13	53
Extractable Hydrocarbons	TEH	mg/L	2 / 24 8%	0.3	0.17	0.47
Nitrogen Compounds	Nitrate	mg/L	10 / 15 67%	0.01	0.1	1.2
	Nitrite	mg/L	1 / 24 4%	0.01	0.01	0.01
Radionuclides	Gross Alpha	pCi/L	2 / 2 100%	na	2.1	2.5
Anions	Chloride	mg/L	22 / 24 92%	1	4.5	10
	Fluoride	mg/L	24 / 24 100%	na	0.4	0.9
	Sulfate	mg/L	24 / 24 100%	na	20	58
	Phosphorus	mg/L	24 / 24 100%	na	0.2	1.2
Water Quality Parameters	Hardness as CaCO3	mg/L	20 / 20 100%	na	307	464
	Carbonate as CO3	mg/L	2 / 24 8%	4	2.5	11
	TDS	mg/L	24 / 24 100%	na	371	549
	TSS	mg/L	4 / 24 17%	10	7.8	36
	DOC	mg/L	23 / 23 100%	na	4.1	15

na = not applicable, all samples detected
TPH = Total Purgeable Hydrocarbons
TEH = Total Extractable Hydrocarbons
[†]Data presented in this table are based on the dissolved fraction for metals
[1] Mean calculated assuming 1/2 DL for NDs

Table 3-5. Phase I Analytical Methods for Sediment

Category	Method	Analytes			
Metals	SW6020 & SW6010B	Aluminum	Chromium	Selenium	
		Antimony	Cobalt	Silver	
		Arsenic	Copper	Thallium	
		Barium	Iron	Vanadium	
		Beryllium	Lead	Zinc	
		Boron	Manganese		
		Cadmium	Nickel		
	SW7471A	Mercury			
Cyanide	SW9012	Total cyanide			
Pesticides	SW8081A	4,4´-DDD	beta-BHC	Endosulfan sulfate	Heptachlor
		4,4´-DDE	Chlordane	Endrin	Heptachlor epoxide
		4,4´-DDT	delta-BHC	Endrin aldehyde	Isodrin
		Aldrin	Dieldrin	Endrin ketone	Methoxychlor
		alpha-BHC	Endosulfan I	gamma-BHC (Lindane)	Toxaphene
		alpha-Chlordane	Endosulfan II	gamma-Chlordane	
	SW8151A	2,4,5-T	Dalapon	MCPA	
		2,4,5-TP (Silvex)	Dicamba	MCPP	
		2,4-D	Dichlorprop	Pentachlorophenol	
Organophosphorus Pesticides	8141A	Dichlorvos	Diazinon	Chlorpyrifos	Stirophos (Tetrachlorovinphos)
		Mevinphos	Disulfoton	Trichloronate	Bolstar (Sulprofos)
		Demeton-O,S	Dimethoate	Methyl Parathion	Fensulfothion
		Ethoprop (Prophos)	Ronnel	Mathion	EPN
		Phorate	Merphos	Tokuthion (Prothiofos)	Azinphos-methyl (Guthion)
		Sulfotep	Fenthion	Ethyl Parathion	Coumaphos
PCBs	SW8082	Aroclor 1016	Aroclor 1242	Aroclor 1260	
		Aroclor 1221	Aroclor 1248	Aroclor 1262	
		Aroclor 1232	Aroclor 1254	Aroclor 1268	
VOCs	SW8260B	1,1,1-Trichloroethane	1,3-Dichlorobenzene	Chlorodibromomethane	Methyl isobutyl ketone
		1,1,2,2-Tetrachloroethane	1,4-Dichlorobenzene	Chloroethane	Methyl tert-butyl ether (MTBE)
		1,1,2-Trichloro-1,2,2-trifluoroethane	1,4-Dioxane	Chloroform	Methylcyclohexane
		1,1,2-Trichloroethane	2-Hexanone	Chloromethane	Methylene chloride
		1,1-Dichloroethane	Acetone	cis-1,2-Dichloroethene	o-Xylene
		1,1-Dichloroethene	Benzene	cis-1,3-Dichloropropene	Styrene
		1,2,3-Trichlorobenzene	Bromochloromethane	Cyclohexane	Tetrachloroethene
		1,2,4-Trichlorobenzene	Bromodichloromethane	Dichlorodifluoromethane	Toluene
		1,2-Dibromo-3-chloropropane	Bromoform	Ethylbenzene	trans-1,2-Dichloroethene
		1,2-Dibromoethane	Bromomethane	Isopropylbenzene	trans-1,3-Dichloropropene
		1,2-Dichlorobenzene	Carbon disulfide	m+p-Xylenes	Trichloroethene
		1,2-Dichloroethane	Carbon tetrachloride	Methyl acetate	Trichlorofluoromethane
		1,2-Dichloropropane	Chlorobenzene	Methyl ethyl ketone	Vinyl chloride
SVOCs	SW8270C	1,2,4,5-Tetrachlorobenzene	3,3´-Dichlorobenzidine	bis(-2-chloroethyl)Ether	Hexachlorocyclopentadiene
		2,3,4,6-Tetrachlorophenol	3-Nitroaniline	bis(2-chloroisopropyl)Ether	Hexachloroethane
		2,4,5-Trichlorophenol	4,6-Dinitro-2-methylphenol	bis(2-ethylhexyl)Phthalate	m+p-Cresols
		2,4,6-Trichlorophenol	4-Bromophenyl phenyl ether	Butylbenzylphthalate	Nitrobenzene
		2,4-Dichlorophenol	4-Chloro-3-methylphenol	Caprolactam	n-Nitroso-di-n-propylamine
		2,4-Dimethylphenol	4-Chlorophenyl phenyl ether	Carbazole	n-Nitrosodiphenylamine
		2,4-Dinitrophenol	4-Nitroaniline	Dibenzofuran	o-Cresol
		2,4-Dinitrotoluene	4-Nitrophenol	Diethyl phthalate	p-Chloroaniline
		2,6-Dinitrotoluene	Acetophenone	Dimethyl phthalate	Pentachlorophenol
		2-Chloronaphthalene	Atrazine	Di-n-butyl phthalate	Phenol
		2-Chlorophenol	Benzaldehyde	Di-n-octyl phthalate	
		2-Nitroaniline	Biphenyl	Hexachlorobenzene	
		2-Nitrophenol	bis(-2-chloroethoxy)Methane	Hexachlorobutadiene	
PAHs	SW8270C	2-Methylnaphthalene	Benzo(a)pyrene	Dibenzo(a,h)anthracene	Naphthalene
		Acenaphthene	Benzo(b)fluoranthene	Fluoranthene	Phenanthrene
		Acenaphthylene	Benzo(g,h,i)perylene	Fluorene	Pyrene
		Anthracene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	
		Benzo(a)anthracene	Chrysene	Isophorone	
Extractable hydrocarbons	MA-EPH	C11 to C22 Aromatics	C9 to C18 Aliphatics		
		C19 to C36 Aliphatics	Total Extractable Hydrocarbons		
	SW8015M	Total Extractable Hydrocarbons			
Volatile hydrocarbons	MA-VPH	C5 to C8 Aliphatics	Benzene	Methyl tert-butyl ether (MTBE)	
		C9 to C10 Aromatics	Ethylbenzene	Naphthalene	
		C9 to C12 Aliphatics	Toluene	m+p-Xylenes	
		Total Purgeable Hydrocarbons	Xylenes, Total	o-Xylene	
Anions	E300.0	Fluoride			
	E365.1	Total Phosphorus			
Sediment quality parameters	ASAM10-3.2	pH, sat. paste			
	SW3550A	Moisture			
	Leco	Carbon, Organic			

Table 3-6. List of Phase I Sediment Stations and Analyses

		Asbestos (LA)		Cations			Cyanide	Pesticides			PCBs	VOCs	SVOCs	PAHs	Pertroleum Hydrocarbons			Anions		Sediment quality parameters		
				TAL Metals		Hg									Extractable HC		Volatile HC	Fluoride	Phosphorus	pH	Moisture	OC
Reach	Station	PLM-VE	PLM-GRAV	SW6020	SW6010B	SW7471A	SW9012	SW8081A	SW8151A	8141A	SW8082	SW8260B	SW8270C	SW8270C	MA-EPH	SW8015M	MA-VPH	E300.0	E365.1	ASAM10-3.2	SW3550A	Leco
Upper Rainy Creek	URC-1	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
Tailings impoundment	TP	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
	TP-TOE2	X	X	X	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
Lower Rainy Creek	LRC-1	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
	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
	LRC-5	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
	FC-Pond	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
Carney Creek	CC-1	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
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	X
	CCS-8	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
	CCS-11	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
	CCS-16	X		X	X	X								X	X	X	X	X	X	X	X	X

X = Sample analyzed

Table 3-7. Phase I Asbestos Results for Sediment

Reach	Station	ANALYTICAL RESULTS		
		$MF_{LA\%}$ fine	PLM-VE Bin	$MF_{LA\%}$ coarse
Upper Rainy Creek	URC-1	ND	Bin A	--
	URC-2	<1%	Bin B2	Tr
Tailings Impoundment	TP	<1%	Bin B2	Tr
	TP-TOE1	2%	Bin C	0.4%
	TP-TOE2	3%	Bin C	0.03%
Mill Pond	MP	<1%	Bin B2	--
Lower Rainy Creek	LRC-1	<1%	Bin B2	0.1%
	LRC-2	<1%	Bin B2	Tr
	LRC-3	2%	Bin C	--
	LRC-4	<1%	Bin B2	--
	LRC-5	<1%	Bin B2	Tr
	LRC-6	<1%	Bin B2	--
Fleetwood Creek	FC-2	Tr	Bin B1	ND
	FC-Pond	<1%	Bin B2	--
	FC-1	ND	Bin A	ND
Carney Creek	CC-2	<1%	Bin B2	0.2%
	CC-1	4%	Bin C	0.5%
Seeps	CCS-9	7%	Bin C	Tr
	CCS-8	6%	Bin C	0.4%
	CCS-6	2%	Bin C	Tr
	CCS-1	2%	Bin C	Tr
	CCS-11	<1%	Bin B2	0.2%
	CCS-14	<1%	Bin B2	Tr
	CCS-16	4%	Bin C	--

ND = not detected
Tr = trace
MF = mass fraction
-- = no coarse fraction

Table 3-8. Phase I Non-Asbestos Results for Sediment

Category	Detected Analytes	Detection Frequency (DF)	Mean Detection Limit (DL) (mg/kg)	Concentration (mg/kg)		Screening Benchmarks (mg/kg)	
				Mean[a]	Max	TEC	PEC
Metals	Aluminum	24 / 24 100%	na	12,419	33,800	25,519	59,572
	Arsenic	10 / 24 42%	2.00	2.1	7	10	33
	Barium	24 / 24 100%	na	844	4,930	--	--
	Chromium	24 / 24 100%	na	149	988	43	111
	Cobalt	23 / 24 96%	5.00	18	75	--	--
	Copper	24 / 24 100%	na	31	66	32	149
	Iron	24 / 24 100%	na	21,817	54,600	188,400	247,600
	Lead	23 / 24 96%	5.00	27	100	36	128
	Manganese	24 / 24 100%	na	1,240	12,700	631	1,184
	Mercury	2 / 24 8%	0.10	0.1	0.1	0.2	1
	Nickel	23 / 24 96%	5.00	37	226	23	49
	Selenium	4 / 24 17%	0.50	0.4	1.4	--	--
	Thallium	3 / 24 13%	0.60	0.5	4.3	--	--
	Vanadium	24 / 24 100%	na	45	105	--	--
	Zinc	24 / 24 100%	na	27	54	121	459
PAH	Pyrene	1 / 14 7%	0.87	0.4	0.005	0.2	2
VOC	Methyl acetate	2 / 2 100%	na	0.3	0.4	--	--
Extractable Hydrocarbons	C11 to C22 Aromatics	4 / 12 33%	24.41	63	436	--	--
	C19 to C36 Aliphatics	4 / 12 33%	25.63	71	350	--	--
	C9 to C18 Aliphatics	2 / 12 17%	26.40	28	162	--	--
	Total Extractable Hydrocarbons (MA-EPH)	4 / 12 33%	25.13	188	1,240	--	--
	Total Extractable Hydrocarbons (SW8015M)	23 / 24 96%	9.80	176	928	--	--
Volatile Hydrocarbons	C9 to C10 Aromatics	1 / 24 4%	3.86	2.3	10	--	--
	C9 to C12 Aliphatics	1 / 24 4%	3.95	2.0	2.2	--	--
	Total Purgeable Hydrocarbons	3 / 24 13%	3.65	2.9	17	--	--
Anions	Fluoride	5 / 24 21%	1.00	0.9	4.1	--	--
	Total Phosphorus	24 / 24 100%	na	2,564	10,200	--	--
Sediment Quality Parameters	pH, sat. paste	24 / 24 100%	na	7.2	8.2	na	
	Moisture	24 / 24 100%	na	39.9	86	na	
	Carbon, Organic	24 / 24 100%	na	2.5	15	na	

TEC = Threshold Effect Concentrations
PEC = Probable Effect Concentrations
na = not applicable
-- = no benchmark available
[a] Mean calculated assuming 1/2 DL for NDs

Table 3-9. Phase I Analytical Methods for Mine Waste

Category	Method	Analytes			
Metals	SW6020 & SW6010B	Aluminum	Chromium	Selenium	
		Antimony	Cobalt	Silver	
		Arsenic	Copper	Thallium	
		Barium	Iron	Vanadium	
		Beryllium	Lead	Zinc	
		Boron	Manganese		
		Cadmium	Nickel		
	SW7471A	Mercury			
Cyanide	SW9012	Total cyanide			
Pesticides	SW8081A	4,4´-DDD	beta-BHC	Endosulfan sulfate	Heptachlor
		4,4´-DDE	Chlordane	Endrin	Heptachlor epoxide
		4,4´-DDT	delta-BHC	Endrin aldehyde	Isodrin
		Aldrin	Dieldrin	Endrin ketone	Methoxychlor
		alpha-BHC	Endosulfan I	gamma-BHC (Lindane)	Toxaphene
		alpha-Chlordane	Endosulfan II	gamma-Chlordane	
	SW8151A	2,4,5-T	Dalapon	MCPA	
		2,4,5-TP (Silvex)	Dicamba	MCPP	
		2,4-D	Dichlorprop	Pentachlorophenol	
Organophosphorus Pesticides	8141A	Dichlorvos	Diazinon	Chlorpyrifos	Stirophos (Tetrachlorovinphos)
		Mevinphos	Disulfoton	Trichloronate	Bolstar (Sulprofos)
		Demeton-O,S	Dimethoate	Methyl Parathion	Fensulfothion
		Ethoprop (Prophos)	Ronnel	Mathion	EPN
		Phorate	Merphos	Tokuthion (Prothiofos)	Azinphos-methyl (Guthion)
		Sulfotep	Fenthion	Ethyl Parathion	Coumaphos
PCBs	SW8082	Aroclor 1016	Aroclor 1242	Aroclor 1260	
		Aroclor 1221	Aroclor 1248	Aroclor 1262	
		Aroclor 1232	Aroclor 1254	Aroclor 1268	
VOCs	SW8260B	1,1,1-Trichloroethane	1,3-Dichlorobenzene	Chlorodibromomethane	Methyl isobutyl ketone
		1,1,2,2-Tetrachloroethane	1,4-Dichlorobenzene	Chloroethane	Methyl tert-butyl ether (MTBE)
		1,1,2-Trichloro-1,2,2-trifluoroethane	1,4-Dioxane	Chloroform	Methylcyclohexane
		1,1,2-Trichloroethane	2-Hexanone	Chloromethane	Methylene chloride
		1,1-Dichloroethane	Acetone	cis-1,2-Dichloroethene	o-Xylene
		1,1-Dichloroethene	Benzene	cis-1,3-Dichloropropene	Styrene
		1,2,3-Trichlorobenzene	Bromochloromethane	Cyclohexane	Tetrachloroethene
		1,2,4-Trichlorobenzene	Bromodichloromethane	Dichlorodifluoromethane	Toluene
		1,2-Dibromo-3-chloropropane	Bromoform	Ethylbenzene	trans-1,2-Dichloroethene
		1,2-Dibromoethane	Bromomethane	Isopropylbenzene	trans-1,3-Dichloropropene
		1,2-Dichlorobenzene	Carbon disulfide	m+p-Xylenes	Trichloroethene
		1,2-Dichloroethane	Carbon tetrachloride	Methyl acetate	Trichlorofluoromethane
		1,2-Dichloropropane	Chlorobenzene	Methyl ethyl ketone	Vinyl chloride
SVOCs	SW8270C	1,2,4,5-Tetrachlorobenzene	3,3´-Dichlorobenzidine	bis(-2-chloroethyl)Ether	Hexachlorocyclopentadiene
		2,3,4,6-Tetrachlorophenol	3-Nitroaniline	bis(2-chloroisopropyl)Ether	Hexachloroethane
		2,4,5-Trichlorophenol	4,6-Dinitro-2-methylphenol	bis(2-ethylhexyl)Phthalate	m+p-Cresols
		2,4,6-Trichlorophenol	4-Bromophenyl phenyl ether	Butylbenzylphthalate	Nitrobenzene
		2,4-Dichlorophenol	4-Chloro-3-methylphenol	Caprolactam	n-Nitroso-di-n-propylamine
		2,4-Dimethylphenol	4-Chlorophenyl phenyl ether	Carbazole	n-Nitrosodiphenylamine
		2,4-Dinitrophenol	4-Nitroaniline	Dibenzofuran	o-Cresol
		2,4-Dinitrotoluene	4-Nitrophenol	Diethyl phthalate	p-Chloroaniline
		2,6-Dinitrotoluene	Acetophenone	Dimethyl phthalate	Pentachlorophenol
		2-Chloronaphthalene	Atrazine	Di-n-butyl phthalate	Phenol
		2-Chlorophenol	Benzaldehyde	Di-n-octyl phthalate	
		2-Nitroaniline	Biphenyl	Hexachlorobenzene	
		2-Nitrophenol	bis(-2-chloroethoxy)Methane	Hexachlorobutadiene	
PAHs	SW8270C	2-Methylnaphthalene	Benzo(a)pyrene	Dibenzo(a,h)anthracene	Naphthalene
		Acenaphthene	Benzo(b)fluoranthene	Fluoranthene	Phenanthrene
		Acenaphthylene	Benzo(g,h,i)perylene	Fluorene	Pyrene
		Anthracene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	
		Benzo(a)anthracene	Chrysene	Isophorone	
Extractable hydrocarbons	MA-EPH	C11 to C22 Aromatics	C9 to C18 Aliphatics		
		C19 to C36 Aliphatics	Total Extractable Hydrocarbons		
	SW8015M	Total Extractable Hydrocarbons			
Volatile hydrocarbons	MA-VPH	C5 to C8 Aliphatics	Benzene	Methyl tert-butyl ether (MTBE)	
		C9 to C10 Aromatics	Ethylbenzene	Naphthalene	
		C9 to C12 Aliphatics	Toluene	m+p-Xylenes	
		Total Purgeable Hydrocarbons	Xylenes, Total	o-Xylene	
Anions	E300.0	Fluoride			
	E365.1	Total Phosphorus			
Sediment quality parameters	ASAM10-3.2	pH, sat. paste			
	SW3550A	Moisture			
	Leco	Carbon, Organic			

Table 3-10. List of Phase I Mine Waste Stations and Analyses

Reach	Station	Asbestos (LA)		Cations			Cyanide	Pesticides			PCBs	VOCs	SVOCs	PAHs	Pertroleum Hydrocarbons			Anions		Sediment quality parameters		
				TAL Metals		Hg									Extractable HC		Volatile HC	Fluoride	Phosphorus	pH	Moisture	OC
		PLM-VE	PLM-GRAV	SW6020	SW6010B	SW7471A	SW9012	SW8081A	SW8151A	8141A	SW8082	SW8260B	SW8270C	SW8270C	MA-EPH	SW8015M	MA-VPH	E300.0	E365.1	ASAM10-3.2	SW3550A	Leco
Road	MS-1	X	X	X	X	X					X			X	X	X	X	X	X	X	X	X
	MS-2	X	X	X	X	X					X			X	X	X	X	X	X	X	X	X
	MS-3	X	X	X	X	X					X			X	X	X	X	X	X	X	X	X
Tailings Impoundment	MS-4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	MS-5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Coarse Tailings	MS-6	X	X	X	X	X										X	X	X	X	X	X	X
	MS-7	X	X	X	X	X										X	X	X	X	X	X	X
	MS-8	X	X	X	X	X										X	X	X	X	X	X	X
	MS-9	X	X	X	X	X										X	X	X	X	X	X	X
Cover Material	MS-10	X	X	X	X	X										X	X	X	X	X	X	X
	MS-11	X	X	X	X	X										X	X	X	X	X	X	X
	MS-12	X	X	X	X	X										X	X	X	X	X	X	X
	MS-13	X	X	X	X	X										X	X	X	X	X	X	X
	MS-21	X	X	X	X	X										X	X	X	X	X	X	X
	MS-22	X	X	X	X	X										X	X	X	X	X	X	X
	MS-23	X	X	X	X	X										X	X	X	X	X	X	X
	MS-24	X	X	X	X	X										X	X	X	X	X	X	X
Waste Rock	MS-14	X	X	X	X	X										X	X	X	X	X	X	X
	MS-15	X	X	X	X	X										X	X	X	X	X	X	X
	MS-16	X	X	X	X	X										X	X	X	X	X	X	X
	MS-17	X	X	X	X	X										X	X	X	X	X	X	X
	MS-18	X	X	X	X	X										X	X	X	X	X	X	X
	MS-19	X	X	X	X	X										X	X	X	X	X	X	X
	MS-20	X	X	X	X	X								X	X	X	X	X	X	X	X	X
	MS-26	X	X	X	X	X										X	X	X	X	X	X	X
	MS-27	X	X	X	X	X										X	X	X	X	X	X	X
	MS-28	X	X	X	X	X										X	X	X	X	X	X	X
	MS-29	X	X	X	X	X										X	X	X	X	X	X	X
	MS-30	X	X	X	X	X										X	X	X	X	X	X	X
	MS-32	X	X	X	X	X										X	X	X	X	X	X	X
Outcrop	MS-25	X	X	X	X	X												X	X	X	X	X
	MS-31	X	X	X	X	X												X	X	X	X	X
	MS-33	X	X	X	X	X												X	X	X	X	X
	MS-34	X	X	X	X	X												X	X	X	X	X
	MS-35	X	X	X	X	X												X	X	X	X	X
	MS-36	X	X	X	X	X												X	X	X	X	X
	MS-37	X	X	X	X	X												X	X	X	X	X
	MS-38	X	X	X	X	X												X	X	X	X	X

X = Sample Analyzed

Table 3-11. Phase I Asbestos Results for Mine Waste and On-Site Soils

Sampling Matrix	StationID	ANALYTICAL RESULTS		
		$MF_{LA\%}$ fine	PLM-VE Bin	$MF_{LA\%}$ coarse
Road	MS-1	<1%	Bin B2	Tr
	MS-2	<1%	Bin B2	Tr
	MS-3	Tr	Bin B1	Tr
Tailings Impoundment	MS-4	<1%	Bin B2	Tr
	MS-5	<1%	Bin B2	Tr
Coarse Tailings	MS-6	<1%	Bin B2	0.3%
	MS-7	2%	Bin C	1.0%
	MS-8	<1%	Bin B2	Tr
	MS-9	<1%	Bin B2	0.6%
Cover Material	MS-10	<1%	Bin B2	0.1%
	MS-11	<1%	Bin B2	0.1%
	MS-12	<1%	Bin B2	2.6%
	MS-13	Tr	Bin B1	Tr
	MS-21	<1%	Bin B2	Tr
	MS-22	<1%	Bin B2	0.4%
	MS-23	ND	Bin A	Tr
	MS-24	2%	Bin C	1.4%
Waste Rock	MS-14	<1%	Bin B2	3.7%
	MS-15	5%	Bin C	Tr
	MS-16	2%	Bin C	0.5%
	MS-17	<1%	Bin B2	1.1%
	MS-18	<1%	Bin B2	1.9%
	MS-19	<1%	Bin B2	0.8%
	MS-20	<1%	Bin B2	Tr
	MS-26	3%	Bin C	0.2%
	MS-27	<1%	Bin B2	1.9%
	MS-28	<1%	Bin B2	3.3%
	MS-29	2%	Bin C	1.3%
	MS-30	<1%	Bin B2	0.3%
	MS-32	<1%	Bin B2	1.7%
Outcrop	MS-25	8%	Bin C	1.7%
	MS-31	<1%	Bin B2	0.7%
	MS-33	<1%	Bin B2	0.2%
	MS-34	<1%	Bin B2	0.5%
	MS-35	Tr	Bin B1	0.006%
	MS-36	<1%	Bin B2	0.3%
	MS-37	<1%	Bin B2	0.2%
	MS-38	<1%	Bin B2	0.4%

Table 3-12. Non-Asbestos Results for Mine Waste and Soil

Category	Detected Analytes	Detection Frequency (DF)	Mean Detection Limit (DL)	Concentration (mg/kg)	
				Mean[1]	Max
Metals	Aluminum	38 / 38 100%	na	17,874	50,900
	Antimony	1 / 38 3%	0.30	0.15	0.30
	Arsenic	4 / 38 11%	2.00	1.16	3.00
	Barium	38 / 38 100%	na	917	3,200
	Chromium	38 / 38 100%	na	218	881
	Cobalt	38 / 38 100%	na	27	63
	Copper	37 / 38 97%	5.00	31	109
	Iron	38 / 38 100%	na	24,905	51,900
	Lead	36 / 38 95%	5.00	19	50
	Manganese	38 / 38 100%	na	357	808
	Mercury	1 / 38 3%	0.10	0.06	0.30
	Nickel	38 / 38 100%	na	57	135
	Thallium	3 / 38 8%	0.60	0.34	0.90
	Vanadium	38 / 38 100%	na	39	114
	Zinc	38 / 38 100%	na	27	70
PAHs	Benzo(a)anthracene	2 / 6 33%	0.37	0.13	0.21
	Benzo(a)pyrene	1 / 6 17%	0.30	0.13	0.21
	Benzo(b)fluoranthene	1 / 6 17%	0.30	0.13	0.21
	Benzo(g,h,i)perylene	1 / 6 17%	0.30	0.13	0.21
	Benzo(k)fluoranthene	1 / 6 17%	0.30	0.13	0.21
	Chrysene	2 / 6 33%	0.37	0.13	0.21
	Indeno(1,2,3-cd)pyrene	1 / 6 17%	0.30	0.13	0.21
	Pyrene	2 / 6 33%	0.37	0.13	0.21
	Total HMW-PAHs			1.02	1.68
Pesticide	Pentachlorophenol[2]	1 / 2 50%	0.003	0.02	0.04
VOC	Methyl acetate	2 / 2 100%	na	1.13	1.7
Extractable Hydrocarbons	C11 to C22 Aromatics	5 / 6 83%	13	33	78
	C19 to C36 Aliphatics	6 / 6 100%	na	80	154
	C9 to C18 Aliphatics	2 / 6 33%	11	17	53
	TEH (MA-EPH)	6 / 6 100%	na	173	365
	TEH (SW8015M)	22 / 30 73%	10.43	61.22	474
Volatile Hydrocarbons	Toluene (MA-VPH)	1 / 30 3%	0.04	0.02	0.071
	C5 to C8 Aliphatics	1 / 30 3%	1.66	0.85	1.4
	C9 to C10 Aromatics	1 / 30 3%	1.66	1.33	16
	Total Purgeable Hydrocarbons	3 / 30 10%	1.66	1.53	17
Anions	Fluoride	2 / 38 5%	1.0	0.73	5
	Total Phosphorus	38 / 38 100%	na	2,733	11,700
Soil Quality Parameters	Carbon, Organic	38 / 38 100%	na	0.59	3
	Moisture	38 / 38 100%	na	8.70	33
	pH, sat. paste	38 / 38 100%	na	7.73	8.5

na = not applicable

[1] Mean calculated assuming 1/2 DL for NDs

[2]Based on analytical method SW8151A

Table 3-13. Phase I Asbestos Results for Tree Bark

Transect ID	StationID	Approximate Distance From Mine (miles)	N LA Strucs	Sensitivity ($1/cm^2$)	Surface Loading (Total LA MS/cm^2)	Total LA Mass Fraction, dried sample (%)
SL45 Approximate downwind from mine area.	SL45-01	0.5	70	6E+04	4.2	0.0016%
	SL45-02	1.0	57	2E+04	0.9	0.0014%
	SL45-03	1.5	55	3E+04	1.6	0.0008%
	SL45-04	2.0	62	6E+04	3.8	0.0073%
	SL45-05	2.5	8	5E+03	0.04	0.0000%
	SL45-06	3.0	50	3E+04	1.7	0.0195%
	SL45-07	3.5	51	2E+05	11.3	0.0545%
	SL45-08	4.0	54	1E+04	0.5	0.0007%
	SL45-09	4.5	32	9E+03	0.3	0.0004%
	SL45-10	5.0	0	1E+04	<DL	0.000%
	SL45-11	5.5	33	1E+04	0.3	0.0004%
	SL45-12	6.0	85	9E+03	0.8	0.0010%
	SL45-13	6.5	8	1E+04	0.08	0.00003%
	SL45-14	7.0	1	1E+04	0.01	0.0000004%
	SL45-15	7.5	3	9E+03	0.03	0.0003%
	SL45-16	8.0	0	9E+03	<DL	0.000%
SL15 30º counterclock-wise from approximate primary downwind direction.	SL15-02	1.0	58	6E+04	3.4	0.0028%
	SL15-03	1.5	61	2E+04	1.2	0.0025%
	SL15-04	2.0	53	3E+05	16.2	0.0378%
	SL15-05	2.5	51	2E+04	1.0	0.0045%
	SL15-06	3.0	53	3E+04	1.6	0.0005%
	SL15-07	3.5	50	3E+04	1.6	0.0047%
	SL15-08	4.0	16	9E+03	0.1	0.0010%
	SL15-09	4.5	10	9E+03	0.09	0.0002%
	SL15-10	5.0	4	9E+03	0.04	0.0001%
	SL15-11	5.5	0	9E+03	<DL	0.000%
	SL15-12	6.0	0	1E+04	<DL	0.000%
	SL15-13	6.5	0	9E+03	<DL	0.000%
	SL15-14	7.0	0	9E+03	<DL	0.000%
	SL15-15	7.5	0	1E+04	<DL	0.000%
	SL15-16	8.0	0	9E+03	<DL	0.000%
SL75 30º clockwise from approximate primary downwind direction.	SL75-02	1.0	6	7E+03	0.04	0.00002%
	SL75-03	1.5	108	1E+05	12.9	0.0185%
	SL75-04	2.0	44	9E+03	0.4	0.0003%
	SL75-05	2.5	66	6E+04	4.0	0.0182%
	SL75-06	3.0	57	8E+04	4.4	0.0048%
	SL75-07	3.5	6	9E+03	0.05	0.0001%
	SL75-08	4.0	28	9E+03	0.2	0.0004%
	SL75-09	4.5	36	9E+03	0.3	0.0004%
	SL75-13	5.0	6	9E+03	0.05	0.0001%
	SL75-14	5.5	13	9E+03	0.1	0.0001%
	SL75-15	6.0	30	9E+03	0.3	0.0007%
	SL75-16	6.5	9	9E+03	0.08	0.00003%
SL195 Generally upwind of mine area/possibly downwind from Screening Plant.	SL195-02	1.0	50	1E+05	5.7	0.0083%
	SL195-03	1.5	54	4E+04	2.2	0.0022%
	SL195-04	2.0	2	9E+03	0.02	0.0001%
	SL195-05	2.5	55	2E+04	1.0	0.0011%
	SL195-06	3.0	51	2E+04	0.8	0.0013%
	SL195-07	3.5	8	8E+03	0.06	0.0001%
	SL195-08	4.0	17	9E+03	0.2	0.0004%
	SL195-10	4.5	35	9E+03	0.3	0.0002%
	SL195-11	5.0	50	1E+04	0.5	0.0035%
	SL195-12	5.5	3	9E+03	0.03	0.00002%
SL255 Approximate upwind direction from mine area.	SL255-02	1.0	53	6E+04	3.2	0.0025%
	SL255-03	1.5	25	8E+03	0.2	0.0002%
	SL255-04	2.0	57	1E+05	6.6	0.0095%
	SL255-05	2.5	51	1E+04	0.5	0.0004%
	SL255-06	3.0	61	1E+05	8.8	0.0033%
SL135 Across-gradient from primary downwind direction.	SL135-01	0.5	127	6E+04	7.8	0.0108%
	SL135-02	1.0	64	1E+05	7.5	0.0823%
	SL135-03	1.5	53	1E+05	5.4	0.0019%
	SL135-04	2.0	52	8E+04	4.2	0.0012%
	SL135-05	2.5	33	9E+03	0.3	0.0010%
	SL135-06	3.0	51	5E+04	2.4	0.0081%
	SL135-07	3.5	13	9E+03	0.1	0.0002%
	SL135-08	4.0	19	9E+03	0.2	0.00005%
SL315 Across-gradient from primary downwind direction.	SL315-01	0.5	84	1E+05	9.9	0.0084%
	SL315-02	1.0	61	3E+04	1.8	0.0057%
	SL315-03	1.5	65	2E+04	1.3	0.0020%
	SL315-04	2.0	58	1E+04	0.6	0.0028%
	SL315-05	2.5	23	9E+03	0.2	0.0003%
	SL315-06	3.0	50	3E+04	1.5	0.0012%
	SL315-07	3.5	2	9E+03	0.02	0.0001%
	SL315-08	4.0	5	9E+03	0.04	0.0001%

MS/cm^2 = million structures per square centimeter

Table 3-14. Age Data for Trees

Transect ID	StationID	Age of Tree (yrs)*	Approximate Distance From Mine (miles)
SL45 Approximate downwind from mine area.	SL45-08	51	4.0
	SL45-16	29	8.0
SL15 30º counterclock-wise from approximate primary downwind direction.	SL15-10	92	5.0
	SL15-11	100	5.5
	SL15-15	50	7.5
SL75 30º clockwise from approximate primary downwind direction.	SL75-04	79	2.0
	SL75-16	67	6.5
SL195 Generally upwind of mine area/possibly downwind from Screening Plant.	SL195-05	83	2.5
	SL195-08	48	4.0
SL255 Approximate upwind direction from mine area.	SL255-05	66	2.5
SL135 Across-gradient from primary downwind direction.	SL135-05	79	2.5
SL315 Across-gradient from primary downwind direction.	SL315-06	82	3.0

*Based on number of rings

Table 3-15. Phase I Asbestos Results for Forest Soils

Transect ID	StationID	PLM RESULTS		
		$MF_{LA\%}$ fine	PLM-VE Bin	$MF_{LA\%}$ coarse
SL45 Approximate downwind from mine area.	SL45-01	<1%	Bin B2	Tr
	SL45-02	ND	Bin A	Tr
	SL45-03	Tr	Bin B1	Tr
	SL45-04	ND	Bin A	ND
	SL45-05	ND	Bin A	ND
	SL45-06	ND	Bin A	ND
	SL45-07	ND	Bin A	ND
	SL45-08	ND	Bin A	ND
	SL45-09	ND	Bin A	ND
	SL45-10	ND	Bin A	ND
	SL45-11	ND	Bin A	--
	SL45-12	ND	Bin A	ND
	SL45-13	ND	Bin A	ND
	SL45-14	ND	Bin A	ND
	SL45-15	ND	Bin A	ND
	SL45-16	ND	Bin A	ND
SL15 30º counterclock-wise from approximate primary downwind direction.	SL15-02	Tr	Bin B1	ND
	SL15-03	Tr	Bin B1	Tr
	SL15-04	ND	Bin A	ND
	SL15-05	ND	Bin A	--
	SL15-06	ND	Bin A	ND
	SL15-07	ND	Bin A	ND
	SL15-08	ND	Bin A	ND
	SL15-09	ND	Bin A	ND
	SL15-10	ND	Bin A	ND
	SL15-11	ND	Bin A	ND
	SL15-12	ND	Bin A	ND
	SL15-13	ND	Bin A	--
	SL15-14	ND	Bin A	ND
	SL15-15	ND	Bin A	ND
	SL15-16	ND	Bin A	ND
SL75 30º clockwise from approximate primary downwind direction.	SL75-02	Tr	Bin B1	--
	SL75-03	ND	Bin A	ND
	SL75-04	Tr	Bin B1	ND
	SL75-05	ND	Bin A	ND
	SL75-06	ND	Bin A	ND
	SL75-07	ND	Bin A	ND
	SL75-08	ND	Bin A	ND
	SL75-09	ND	Bin A	ND
	SL75-13	ND	Bin A	--
	SL75-14	ND	Bin A	ND
	SL75-15	ND	Bin A	ND
	SL75-16	ND	Bin A	ND
SL195 Generally upwind of mine area/possibly downwind from Screening Plant.	SL195-02	ND	Bin A	ND
	SL195-03	ND	Bin A	ND
	SL195-04	ND	Bin A	ND
	SL195-05	ND	Bin A	ND
	SL195-06	ND	Bin A	ND
	SL195-07	ND	Bin A	Tr
	SL195-08	ND	Bin A	ND
	SL195-10	ND	Bin A	--
	SL195-11	ND	Bin A	ND
	SL195-12	ND	Bin A	ND
SL255 Approximate upwind direction from mine area.	SL255-02	ND	Bin A	Tr
	SL255-03	ND	Bin A	ND
	SL255-04	ND	Bin A	ND
	SL255-05	ND	Bin A	ND
	SL255-06	ND	Bin A	Tr
SL135 Across-gradient from primary downwind direction.	SL135-01	6%	Bin C	1.3%
	SL135-02	Tr	Bin B1	Tr
	SL135-03	ND	Bin A	ND
	SL135-04	ND	Bin A	ND
	SL135-05	ND	Bin A	ND
	SL135-06	ND	Bin A	ND
	SL135-07	ND	Bin A	ND
	SL135-08	ND	Bin A	ND
SL315 Across-gradient from primary downwind direction.	SL315-01	Tr	Bin B1	--
	SL315-02	ND	Bin A	ND
	SL315-03	ND	Bin A	ND
	SL315-04	ND	Bin A	ND
	SL315-05	ND	Bin A	ND
	SL315-06	ND	Bin A	ND
	SL315-07	ND	Bin A	ND
	SL315-08	ND	Bin A	ND

ND = not detected
Tr = trace
MF = mass fraction
-- = no coarse fraction

Table 5-1. Libby OU3 Phase IIC Aquatic Ecological Sampling Program Elements						
Program Element		**Receptors**	**Description**	**Field Sampling Locations**	**Field Samples**	**Laboratory Analyses Required**
1	Site-Specific Sediment Toxicity Testing	Benthic Invertebrates	Sediments collected and toxicity testing conducted with two organisms in 42 day exposures. Part 1 of testing is with the two highest concentrations of LA followed by Part 2 testing based on Part 1 results (Figure 5-1).	Part 1: Locations will be identified based on Phase I and Phase IIA results. Part 2: Upper Rainy Creek (URC-1A, URC-2) Lower Rainy Creek (LRC-2, LRC-3, LRC-5) Fleetwood Creek (FC-2) Carney Creek (CC-1) Tailings Impoundment (TP-TOE2) Bobtail Creek Tributary Reference (BTT-R1) Bobtail Creek Reference (BTC-R1) Noisy Creek Reference (NSY-R1)	1) Grab samples of sediment 2) Grab samples of surface water (reference locations only)	1) Asbestos and other chemicals in sediment 2) Asbestos and other chemicals in surface water 3) Toxicity testing of sediment 4) Particle size distribution in sediment
2	Population and Community Demographics	Benthic Invertebrates	Benthic invertebrates collected, enumerated and species identified. Metrics calculated according to EPA RBP and Biological Condition Score calculated for each sampling location and compared to reference.	Upper Rainy Creek (URC-1A, URC-2) Lower Rainy Creek (LRC-1, LRC-2, LRC-3, LRC-5) Tailings Impoundment (TP-TOE2) Bobtail Creek Tributary Reference (BTT-R1) Bobtail Creek Reference (BTC-R1) Noisy Creek Reference (NSY-R1)	1) Composite samples collected according to EPA Rapid Bioassessment Procedures (RBP). 2) Three surber samples collected for comparison to Forest Service Data.	Benthic invertebrate identification and enumeration
		Fish	Fish collected and species identified and enumerated and size recorded. Sub sample of fish	Upper Rainy Creek (URC-1A, URC-2) Lower Rainy Creek (LRC-1, LRC-2, LRC-3, LRC-5) Tailings Impoundment (TP-TOE2) Bobtail Creek Tributary Reference (BTT-R1) Bobtail Creek Reference (BTC-R1) Noisy Creek Reference (NSY-R1)	None	None

Table 5-2. Libby OU3 Phase IIC – Rainy Creek Watershed Aquatic Ecological Sampling Summary

Station ID		Station Description	Asbestos in Sediment [1] $MF_{LA\%}$ fine	Chromium in Sediment [1] mg/kg	Manganese in Sediment [1] mg/kg	Surface Water Chemical Analysis	Sediment Chemical Analysis	Sediment Toxicity Testing	Benthic Invert. Community	Fish Population
Rainy Creek	URC-1	Upper Rainy Creek above	ND	6	306					
	URC-1A	Upper Rainy Creek above Mine Area 100 yards north of Rainy Creek Rd.	NS	NS	NS		√[3]	√[3]	√	√
	URC-2	Upper Rainy Creek above Mine Area	<1%	32.8	346		√[3]	√[3]	√	√
	LRC-1	Lower Rainy Creek above confluence with Carney Creek	<1%	148	299				√	√
	LRC-2	Lower Rainy Creek below confluence with Carney Creek	<1%	135	785		√[3]	√[3]	√	√
	LRC-3	Lower Rainy Creek	2%	233	798		√[a]	√[3]	√	√
	LRC-4	Lower Rainy Creek	<1%	38.8	301					
	LRC-5	Lower Rainy Creek	<1%	129	493		√[3]	√[3]	√	√
	LRC-6	Lower Rainy Creek just above confluence with the Kootenai River	<1%	126	492					
Fleetwood Creek	FC-1	Fleetwood Creek above Mine Area	ND	14.6	302					
	FC-2	Fleetwood Creek above Tailings	Tr	21	151		√[3]	√[3]		
	FC-Pond	Pond on Fleetwood Creek	<1%	289	573					

Table 5-2. Libby OU3 Phase IIC – Rainy Creek Watershed Aquatic Ecological Sampling Summary

	Station ID	Station Description	Asbestos in Sediment [1] $MF_{LA\%}$ fine	Chromium in Sediment [1] mg/kg	Manganese in Sediment [1] mg/kg	Surface Water Chemical Analysis	Sediment Chemical Analysis	Sediment Toxicity Testing	Benthic Invert. Community	Fish Population
Tailings Impoundment	TP	Tailings Impoundment	<1%	110	392					
	UTP	Upper Tailings Impoundment	NS	NS	NS					
	TP-TOE1	Toe drain of impoundment	2%	43	12,700					
	TP-TOE2	Toe drain flow to Rainy Creek below diversion	3%	213	2,470		√[3]	√[3]	√	√
	MP	Mill Pond	<1%	48	953					
Carney Creek	CC-1	Carney Creek	4%	77.2	263		√[3]	√[3]		
	CC-2	Carney Creek just above confluence with Rainy Creek	<1%	43.3	2,920					
	CC-Pond	Pond on lower Carney Creek	NS	NS	NS					
Reference	BTT-R1	Bobtail Creek unnamed tributary	NS	NS	NS	√[2]	√[2]	√[2]	√[2]	√[2]
	BTC-R1	Bobtail Creek	NS	NS	NS	√[2]	√[2]	√[2]	√[2]	√[2]
	NSY-R1	Noisy Creek	NS	NS	NS	√[2]	√[2]	√[2]	√[2]	√[2]

[1] Data are from the Phase I Sampling and Analyses.
[2] Two of the three identified reference locations will be sampled. Two locations will be selected based on an initial field reconnaissance.
[3] Contingent upon the results of Part 1 of the sediment toxicity testing (Figure 5-1).
NS = not sampled in Phase I
MF = mass fraction
LA = Libby amphibole

Table 8-1
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
1-L plastic	Total Suspended Solids (TSS)	Standard Methods 2540D	Cool 4°C	7 days
	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
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
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 8-2
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
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
500 g in plastic jar	Particle Size Analyses	ASTM D422 - 63(2007)	Cool 4°C	None
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 plastic jar	Asbestos	PLM-Grav: SRC-LIBBY-01 (Rev. 2) PLM-VE: SRC-LIBBY-03 (Rev. 2)	None	None
3-liters In plastic jar	Sediment toxicity testing	EPA 100.4 EPA 100.5	Cool 4°C	6 months
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 9-1
List of Non-Asbestos Analyses Required for Surface Water for Phase IIC

Reach	Station	Cations			Water quality parameters				Pesticides		Herbicides	SVOCs/ PAHs
		TAL Metals		Hg	HCO_3,CO_3	TSS	TDS	DOC				
		SW6020	SW6010B	SW7470A	A2320 B	A2540D	A2540C,D	A5310C	SW8081A	SW8141A	SW8151A	SW8270C
Reference	BTT-R1	X	X	X	X	X	X	X	X	X	X	X
	BTC-R1	X	X	X	X	X	X	X	X	X	X	X
	NSY-R1	X	X	X	X	X	X	X	X	X	X	X

X = Sample(s) to be analyzed

Table 9-2

List of Non-Asbestos Analyses Required for Sediment in Phase IIC

		Cations			Pesticides			SVOCs	PAHs	Particle Size Distribution	Sediment quality parameters		
		TAL Metals		Hg							pH	Moisture	OC
Reach	Station	SW6020	SW6010B	SW7470A	SW8081A	SW8151A	8141A	SW8270C	SW8270C	ASTM D422-63	ASAM10-3.2	SW3550A	Leco
Upper Rainy Creek	URC-1A	C	C								C	C	C
	URC-2	C	C								C	C	C
Tailings Impoundment	TP-TOE2	C	C								C	C	C
Lower Rainy Creek	LRC-1												
	LRC-2	C	C								C	C	C
	LRC-3	C	C								C	C	C
	LRC-5	C	C								C	C	C
Fleetwood Creek	FC-2	C	C								C	C	C
Carney Creek	CC-1	C	C									C	C
Reference	BTT-R1	X	X	X	X	X	X	X	X	X	X	X	X
	BTC-R1	X	X	X	X	X	X	X	X	X	X	X	X
	NSY-R1	X	X	X	X	X	X	X	X	X	X	X	X

C = Analyses will be performed if toxicity testing is completed.
X = Testing will be performed

Table 10-1
Summary of Field Quality Control Samples

Field QC Sample Type	Applicable Sample Media	Minimum Collection Frequency	Analyses to be Performed	Acceptance Criteria	Corrective Action
Field Blank	Water	1 per 10 field samples (10%)	TEM	No LA structures detected	Assign qualifier to analyte(s) in field samples associated with field blank (same day, same team)
			Metals	< ½ PQL for all target analytes	
Equipment Rinsate Blank	Water	1 per sampling team per day	TEM	No LA structures detected	Assign qualifier to analyte(s) in field samples associated with field blank (same day, same team)
			Metals	< ½ PQL for all target analytes	
	Solid Media		TEM	No LA structures detected	
			Metals	< ½ PQL for all target analytes	
Field Duplicate	Water	1 per 10 field samples (10%)	TEM	< 5% statistically different	Assign qualifier to analyte(s) in parent field sample
			Same analyte list as original sample	20% RPD for target analytes	
	Sediment	1 per 10 field samples (10%)	PLM-VE	*[Not applicable for field duplicates]*	*[Not applicable for field duplicates]*
			Same analyte list as original sample		
Performance Evaluation (PE)	Water	2 PE samples	Inorganic and organic analytes	(a)	Assign qualifier to field samples for analyte(s) outside of acceptance criteria
	Solid Media	2 PE samples	PLM-VE	<10% strongly discordant	
		2 PE samples	Inorganic and organic analytes	(a)	

(a) meet analyte-specific criteria specified by QATS certification program

Table 10-2

Summary of Laboratory Quality Control Samples for Asbestos Analyses

Panel A: TEM Analyses of Surface Water

Sample Type	QC Frequency Requirement	Number Specified	Notes
		5	
Analytical Laboratory QC Samples			
Laboratory Blank	4% (OU3 project and medium-specific)	1	[a]
Recount Same	1% (OU3 project and medium-specific)	1	
Recount Different	2.5% (OU3 project and medium-specific)	1	
Verified Analysis	1% (OU3 project and medium-specific)	1	
Repreparation	1% (OU3 project and medium-specific)	1	
Interlab	0.5% (OU3 project and medium-specific)	1	[b]

Panel B: PLM Analyses of Sediment

Sample Type	QC Frequency Requirement	Number Specified	Notes
		15	
Preparation Laboratory QC Samples			
Preparation Blank	1 per batch	1	[c]
Preparation Split	1 per 20 field samples (5%)	1	
Analytical Laboratory QC Samples			
Laboratory Duplicate and Interlab	3 per 20 field samples (15%)	2	[b]

[a] Approx. one per analytical laboratory job
[b] To be selected post analysis by EPA
[c] Assumes 1 batch of approx. 20 samples per batch

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
ICP Metals SW-846 6010B (and EPA 200.7 for aqueous samples)	Initial calibration (1 point + blank minimum)	Daily prior to analysis	Correlation coefficient (r) ≥0.995	• Recalibrate
	Interference check standard (ICS)	Beginning and end of each analytical run	Results +/- 20% of true value	• Terminate analysis • Recalibrate instrument • Reanalyze all samples back to last acceptable ICS
	Initial calibration verification (ICV)	After calibration, prior to sample analysis	Results <10% from calibration standard	• Reanalyze ICV • Recalibrate, if ICV still out
	Continuing calibration verification (CCV)	Every 10 samples and end of analytical sequence	Results < 10% from calibration standard	• Reanalyze affected samples back to the last acceptable CCV
	Calibration blank - Initial calibration blank (ICB), Continuing calibration blank (CCB)	After initial calibration verification, each subsequent calibration verification, and at the end of the run	<3x the Method detection limit (MDL)	• Reanalyze blank • Clean system • Reanalyze all samples back to last acceptable blank
	Method blank	1 per preparation batch (≤20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery +/-25% of actual value	• Assess data (4 x rule) • If LCS recoveries are within acceptance criteria, then matrix interference may be suspected • Reanalyze reprep once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples)	RPD <20%	• Same as MS
	Laboratory Control Sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery +/- 20% of actual value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
ICP-MS Metals SW-846 6020 (and EPA 200.8 for aqueous samples)	Mass calibration and resolution check (4 replicates)	Daily prior to analysis	Mass calibration < 0.1 amu; resolution <0.9 amu at 10% peak height; RSD <5%	• Recalibrate
	Initial multipoint calibration (1 point + blank minimum); average of 3 integrations	Daily prior to analysis	None	• None
	Initial calibration verification (ICV); mid-level standard second source	After calibration, prior to sample analysis	± 10% from true value	• Reanalyze ICV • Recalibrate, if ICV still out

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
	Continuing calibration verification (CCV)	Every 10 samples and end of run sequence	± 10% from true value	• Reanalyze affected samples back to the last acceptable CCV
ICP-MS Metals SW-846 6020 (and EPA 200.8 for aqueous samples)	Interference check solution	At beginning of analytical sequence or once every 12 hours, whichever is more frequent	Recoveries +/- 20% of theoretical value	• Internal QC review only; flag data to indicate interference
	Internal Standards	Every CCV, ICB/CCB	Recoveries +/- 20% of initial calibration	• Recalibrate and verify calibration • Reanalyze affected samples
		Every sample	Recoveries 30-120% for samples	• Dilute sample 5x and reanalyze • Repeat until within limits
	Calibration blank Initial calibration blank (ICB) Continuing calibration blank (CCB)	After initial calibration and each subsequent calibration verification	< 3 x Method detection limit (MDL)	• Reanalyze blank • Clean system if still out • Reanalyze affected samples back to the last acceptable CCB
	Method blank	1 per preparation batch (≤ 20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
	Matrix spike (MS)	1 per preparation batch (≤ 20 samples)	% Recovery +/- 25% of true value	• Assess data • Reanalyze MS if matrix is not a factor
	Matrix spike duplicate (MSD) or Matrix duplicate (MD)	1 per preparation batch (≤ 20 samples)	RPD < 20% (for values > 100 x MDL)	• Same as MS
	Post-digestion spike addition	As necessary to assess matrix interference	% Recovery +/- 25% of actual value	• Perform dilution test • Or, perform method of standard addition
	Dilution test	1 per 20 samples	% Recovery +/- 10% of true value	• Use method of standards addition
	Laboratory control sample (LCS)	1 per preparation batch (≤ 0 samples)	%Recovery within +/- 20% of true value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
Mercury SW-846 7470A/7471A	Initial multipoint calibration (3 point + blank minimum)	Daily, prior to analysis	Correlation coefficient (r) ≤0.995	• Recalibrate
	Initial calibration verification (ICV); mid-level standard	After calibration, prior to sample analysis	± 20% of true value	• Reanalyze ICV • Rerun initial calibration
	Continuing calibration verification (CCV); mid-level standard	Every 10 samples and at end of analytical sequence	± 20% of true value	• Reanalyze affected samples back to last acceptable CCV

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
	Calibration blank (ICB/CCB)	After calibration, and after each subsequent calibration verification	< Reporting limit	• Reanalyze blank • Clean system if still out • Reanalyze affected samples back to last acceptable CCB
	Method blank	1 per preparation batch (≤20 samples)	< Reporting limit	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
Mercury SW-846 7470A/7471A	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery +/- 25% of true value	• If LCS recoveries are within acceptance criteria, matrix interference may be suspected • Reprep/reanalyze once if problem cannot be attributed to matrix • Narrate all outliers
	Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples)	RPD < 20%	• Same as MS
	Laboratory control samples (LCS)	1 per preparation batch (≤20 samples)	%Recovery within +/- 20% of true value	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers
SW-846 8270C Semi-Volatiles by GC/MS	Tune the instrument using a decafluorotriphenylphosine (DFTPP) standard	Every 12 hours	Must meet the ion abundance criteria specified in the Degradation of DDT ≤ 20% Benzidine and PCP present at normal response without excessive tailing	• Retune instrument • Repeat standard analysis • Perform injection port, column maintenance as necessary
	Initial calibration (5 point minimum); includes Calibration Check Compounds (CCC), System Performance Calibration Check (SPCC), and Internal Standard Compounds (IS)	Prior to analysis and as required	% RSD for CCC ≤30%; average RF ≥0.05 for SPCC If % RSD ≤15 % average RF may be used; linear calibration required	• Evaluate the system • Repeat calibration
	Continuing calibration verification (CCV); includes CCC, SPCC, and IS	Every 12 hours	CCV percent difference for CCC ≤30%; RF ≥0.05 for SPCC EICP area of each internal standard -50% to +100% of all IS areas in most recent CCV. Retention time for each internal standard must be within 30 seconds of most recent CCV	• Evaluate system/standard • Reanalyze calibration check standard • Repeat the initial calibration as necessary

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
	Method blank	1 per preparation batch (≤20 samples)	<Reporting limit	• Reanalyze blank • Reprep/reanalyze blank and all associated samples
SW-846 8270C Semi-Volatiles by GC/MS	Internal Standard	Every sample, method blank, LCS and MS/MSD	The EICP area for all internal standards must be within -50% and +100% of most recent CCV Retention time for each internal standard must be within 30 seconds of most recent CCV	• Evaluate system/standard • Reanalyze the sample • If still out, report both sets of data
	Surrogate spike	Every sample, method blank, LCS and MS/MSD	No more than one surrogate per fraction outside of acceptance criteria (Refer to Table B1-a) No surrogate below 10% recovery	• Reanalyze sample once • Re-extract and reanalyze if >1 surrogate per fraction outside acceptance limits • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4x rule) • Reanalyze once; if matrix is not a factor • If LCS and surrogate recoveries are within acceptance criteria matrix interference maybe suspected • Narrate all outliers
	Matrix spike duplicate (MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample	1 per preparation batch (≤20 samples)	% Recovery within project QC acceptance criteria for all spiked analytes (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers
SW-846 8081A Organochlorine Pesticides by Gas Chromatography	Column Evaluation Mix	Prior to analysis, both initial and daily	Degradation of DDT and Endrin < 15%	• Evaluate the system • Repeat standard
	Initial calibration (5 point minimum) Lowest at or below PQL Mid level multi-component standards for pattern recognition and retention times	Prior to analysis and as required	RSD < 20%, average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analyte fails • Evaluate the system • Repeat initial calibration

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
	Initial calibration verification (ICV) Mid level standard Expected multi-component compounds	Prior to each 12 hour shift	% Difference ≤15% of expected concentration compared to response from ICAL	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing calibration verification (CCV) Mid level standard Expected multi-component compounds	After every 20 samples and at the end of the analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze CCV and affected samples • For CCV with response > initial calibration response and % difference >15%, samples need not be reanalyzed if no target compounds are detected
SW-846 8081 Organochlorine Pesticides by Gas Chromatography	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CCV and every sample	• Evaluate system/standard; pattern recognition may be sufficient for multi-component compounds only • Reanalyze CCV/affected samples
	Method Blank	1 per preparation batch (≤ 20 samples)	<Reporting limit	• Reanalyze blank • Re-prep/reanalyze blank and associated samples
	Surrogate spike DCB and TCMX	Every sample, method blank, LCS and MS/MSD	% Recovery within QC acceptance criteria (Attachment X). One surrogate must fall within established control limits	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4 x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-extract/reanalyze once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate(MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤ 20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8141A Organphosphorus Pesticides by Gas Chromatography	Initial calibration (5 point minimum) Lowest at or below reporting limit (RL)	Prior to analysis and as required	If %RSD < 20% average RF may be used If linear regression used r > 0.995 or R2 >0.990 Alternate evaluation: Mean % RSD for all target analytes <20% with no individual compound >40%	• Average RSD <20% across all analytes may be used if any analyte fails • Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV), second source Mid level standard	Prior to every analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL	• Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing verification standard (CVS) Mid level standard	After every 10 samples and at the end of the analytical sequence	%D or % Drift >15%	• Evaluate system/standard • Repeat sample analysis to last acceptable CVS
	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CVS and every sample	• Evaluate system/standard; pattern recognition may be sufficient for multi-component compounds only • Reanalyze CVS/affected samples
	Target analyte confirmation	All detected analytes	RPD < 40%	• If greater than 40% qualify data as estimated
SW-846 8141A Organphosphorus Pesticides by Gas Chromatography	Method Blank	1 per preparation batch (≤ 20 samples)	< ½ RL	• Reanalyze blank • Reprep/reanalyze blank and associated samples
	Surrogate spike	Every sample, method blank, LCS and MS/MSD	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze • Reprep/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze • Reprep/reanalyze once • If still out, report both sets of data • Narrate all outliers
	Matrix spike duplicate(MSD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤ 20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Reprep/reanalyze LCS and all associated samples • Narrate all outliers

Table 10-3. Non-Asbestos Laboratory Quality Control Measures by Analytical Methods

Analytical Method[a]	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography	Initial calibration (5 point minimum) Lowest point at or below PQL	Prior to analysis and as required	%RSD <20%, average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analytes fail • Evaluate the system • Repeat initial calibration
	Initial calibration verification (ICV) second source Mid level standard	Prior to each daily analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL	• Average %D ≤15% across all analytes may be used if any analytes fail • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
	Continuing calibration verification (CCV) Mid level standard	After every 20 samples and at the end of the analytical sequence	% Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Evaluate system/standard • Reanalyze CCV and all samples back to last acceptable CCV
	Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	Retention times must be within retention time window established by the daily initial calibration standard Every CCV and every sample	• Evaluate system/standard; • Reanalyze CCV and affected samples
	Method blank	1 per preparation batch (≤20 samples)	<Reporting limit	• Reanalyze blank • Re-prep/reanalyze blank and all associated samples
	Surrogate spike DCAA	Every sample, method blank, LCS and MS/MSD	% Recovery within project QC acceptance criteria (Attachment X)	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography	Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Assess data (4x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-exact/reanalyze once if matrix is not a factor • Narrate all outliers
	Matrix spike duplicate (MSD) or Matrix duplicate (MD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within QC acceptance criteria (Attachment X)	• Same as MS
	Laboratory control sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (Attachment X)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers

EICP Extracted ion current profile, QC Quality control, RF Response factor
RSD Relative standard deviation