

TABLES

TABLE 1

SUMMARY OF 2010 ANALYTICAL DATA FOR SAMPLES COLLECTED AT THE CHANNEL UNDERDRAIN AND DELTA SEEP

Leviathan Mine Site
Alpine County, California

Parameter (mg/L) ^{a,b}	CUD (Influent)			DS (Influent)			Discharge Criteria ^f	
	Minimum ^c	Maximum ^d	Average ^e	Minimum	Maximum	Average	Maximum	Average
pH (field)	3.79	6.61	4.43	2.98	6.47	4.47	NA	6.0-9.0
Dissolved Aluminum	28	56	41	3.5	82	19.74	4.0	2.0
Dissolved Arsenic	0.26	0.67	0.48	0.018	0.047	0.0367	0.34	0.15
Dissolved Calcium	258	295	276	276	793	365.43	NA	NA
Dissolved Cadmium	<0.0002	0.001	0.0004	0.0011	0.0045	0.0022	0.009	0.004
Dissolved Chromium	0.0041	0.021	0.013	<0.0009	0.011	0.003	0.97	0.31
Dissolved Copper	0.003	0.039	0.013	0.034	0.35	0.13	0.026	0.016
Dissolved Iron	306	413	346	12.5	40.2	20.7	2.0	1.0
Dissolved Magnesium	67	77	72	81	250	110	NA	NA
Dissolved Nickel	0.33	1.8	1.2	0.37	0.7	0.5	0.84	0.094
Dissolved Lead	<0.0002	<0.002	0.0003	<0.0002	<0.0002	0.0001	0.136	0.005
Total Selenium	0.00085	0.0044	0.0022	<0.0005	0.0066	0.002	NA	0.005
Dissolved Zinc	0.22	0.41	0.30	0.12	0.45	0.22	0.21	0.21
Hardness (dissolved)	920	1100	987	1000	3000	1371	NA	NA
Acidity	680	1100	944	56	320	174	NA	NA
Alkalinity (Bicarbonate)	<2.4	<2.4	1.2	<2.4	23.2	7.57	NA	NA
Alkalinity (Carbonate)	<1.2	<1.2	0.6	<1.2	<1.2	0.6	NA	NA
Alkalinity (Hydroxide)	<0.7	<0.7	0.35	<0.7	<0.7	0.35	NA	NA
Total Chloride	3.9	6.1	5	<2.3	3.7	3	NA	NA
Total Alkalinity	<2	<2	1	<2	19	6.21	NA	NA
Sulfate	1760	2300	2006	1080	1580	1328	NA	NA
TDS	2960	3530	3239	1760	2310	2049	NA	NA
TSS	12	110	53	30	140	52	NA	NA

Notes

^a Constituents that were not detected are listed as "<" the detection limit value.

^b Data from the DS and CUD was collected between May 2010 and November 2010.

^c Maximum values represent the highest detected concentration during the period of sample collection.

^d Minimum values represent the lowest detected concentration or the method detection limit if analyte was not detected at least once during the sampling period.

^e Average values represent the calculated mean of concentrations during the sampling period. If the analyte was not detected, half of the detection limit was used to calculate the average.

^f Discharge criteria and basis for maximum and average values are listed in the *Request for Approval of Modification to the Removal Action at the Leviathan Mine Memorandum* (U.S. EPA, 2008).

Abbreviations

CUD = Channel Underdrain

DS = Delta Seep

mg/L = milligrams per liter

NA = Not applicable

TDS = Total dissolved solids

TSS = Total suspended solids

TABLE 2

SUMMARY OF 2010 ANALYTICAL DATA FOR THE HIGH DENSITY SLUDGE TREATMENT SYSTEM

Leviathan Mine Site
Alpine County, California

Parameter (mg/L) ^{a,b}	HDS Treatment Plant Influent			HDS Treatment Plant Effluent ^f			Discharge Criteria ^g	
	Minimum ^c	Maximum ^d	Average ^e	Minimum	Maximum	Average	Maximum	Average
pH (field)	2.46	5.73	3.13	7.6	8.68	8.31	NA	6.0-9.0
Dissolved Aluminum	21	47	34	0.29	0.81	0.5	4.0	2.0
Dissolved Arsenic	0.048	0.12	0.09	<0.0009	0.0016	0.0006	0.34	0.15
Dissolved Calcium	257	331	300	297	644	527	NA	NA
Dissolved Cadmium	0.00046	0.002	0.001	<0.0001	<0.0001	0.0001	0.009	0.004
Dissolved Chromium	0.0078	0.014	0.011	<0.0009	<0.0009	0.00050	0.97	0.31
Dissolved Copper	0.024	0.17	0.06	0.0028	0.008	0.005	0.026	0.016
Dissolved Iron	101	191	152	<0.015	0.636	0.23	2.0	1.0
Dissolved Magnesium	69	83	79	38	84	73	NA	NA
Dissolved Nickel	0.81	1.4	1	0.009	0.041	0.03	0.84	0.094
Dissolved Lead	<0.0002	0.00053	0.0002	<0.0002	<0.0002	0.0001	0.136	0.005
Total Selenium	<0.0005	0.0035	0.0019	<0.0005	0.0046	0.002	NA	0.005
Dissolved Zinc	0.2	0.33	0.3	0.0026	0.041	0.008	0.21	0.21
Hardness	930	1200	1079	900	1900	1620	NA	NA
Acidity	460	820	646	<2	26	6	NA	NA
Alkalinity (Bicarbonate)	<2.4	<2.4	1.2	19.5	36.6	28	NA	NA
Alkalinity (Carbonate)	<1.2	<1.2	0.6	<1.2	<1.2	0.6	NA	NA
Alkalinity (Hydroxide)	<0.7	<0.7	0.35	<0.7	<0.7	0.35	NA	NA
Total Alkalinity	<2	<2	1	16	30	23	NA	NA
Sulfate	1410	2020	1743	967	2010	1718	NA	NA
TDS	2360	3170	2687	1420	2940	2539	NA	NA
TSS	14	420	92	<1	92	38	NA	NA

Notes

- ^a Constituents that were not detected are listed as "<" the detection limit value.
- ^b Data collected between May 2010 and November 2010. Grab samples were collected for laboratory analysis except in the case of
- ^c Maximum values represent the highest detected concentration during the period of sample collection.
- ^d Minimum values represent the lowest detected concentration or the method detection limit if analyte was not detected at least once
- ^e Average values represent the calculated mean of concentrations during the sampling period. If the analyte was not detected, half of the detection limit was used to calculate the average.
- ^f Effluent samples for laboratory analysis were collected as composites of three temporally segregated grab samples during one day, each grab sample was field filtered and acid fixed as required promptly after collection.
- ^g Discharge criteria and basis for maximum and average values are listed in the *Request for Approval of Modification to the Removal Action at the Leviathan Mine Memorandum* (U.S. EPA, 2008).
- 2010 Channel Underdrain and Delta Seep data is presented in Table 1.

Abbreviations

mg/L = milligrams per liter
 NA = Not applicable
 HDS = High density sludge
 TDS = Total dissolved solids
 TSS = Total suspended solids

TABLE 3

SUMMARY OF 2010 ANALYTICAL DATA FOR THE ASPEN SEEP BIOREACTOR TREATMENT SYSTEM

Leviathan Mine Site
Alpine County, California

Parameter (mg/L) ^{a,b}	AS Bioreactor Influent			AS Bioreactor Effluent			Discharge Criteria ^f	
	Minimum ^c	Maximum ^d	Average ^e	Minimum	Maximum	Average	Maximum	Average
pH (field)	2.6	3.3	2.9	6.2	8.6	7.5	NA	6.0-9.0
Dissolved Aluminum	35	42	40	<0.04	4	0.5	4.0	2.0
Dissolved Arsenic	<0.0009	<0.0009	0.0005	<0.0009	0.0029	0.001	0.34	0.15
Dissolved Calcium	260	312	294	127	308	255	NA	NA
Dissolved Cadmium	<0.0001	0.002	0.001	<0.0001	0.00029	0.0001	0.009	0.004
Dissolved Chromium	<0.0009	0.0035	0.002	<0.0009	0.0039	0.001	0.97	0.31
Dissolved Copper	0.0023	0.69	0.5	<0.0005	0.079	0.009	0.026	0.016
Dissolved Iron	100	127	111	<0.015	22.7	4	2.0	1.0
Hardness	950	1100	1056	540	1200	948	NA	NA
Dissolved Magnesium	69	80	76	37	140	76	NA	NA
Dissolved Nickel	0.008	0.45	0.4	0.0011	0.155	0.04	0.84	0.094
Dissolved Lead	<0.0002	0.00037	0.0001	<0.0002	0.00035	0.0001	0.136	0.005
Dissolved Selenium	0.0017	0.0028	0.0023	0.0013	0.0017	0.0014	NA	NA
Total Selenium	0.00065	0.0028	0.002	0.00055	0.0029	0.0013	NA	0.005
Dissolved Zinc	0.12	0.65	0.5	<0.0025	0.42	0.03	0.21	0.21
Acidity	500	720	584	<2	32	3	NA	NA
Alkalinity (Bicarbonate)	<2.4	<2.4	1.2	39	600	259	NA	NA
Alkalinity (Carbonate)	<1.2	<1.2	0.6	<1.2	<1.2	0.6	NA	NA
Alkalinity (Hydroxide)	<0.7	<0.7	0.35	<0.7	<0.7	0.35	NA	NA
Total Alkalinity	<2	<2	1	32	492	212	NA	NA
Total Chloride	2.25	8	4	1.7	210	18	NA	NA
Sulfate	1500	1920	1676	1070	1770	1378	NA	NA
TDS	2200	2820	2518	1750	2750	2259	NA	NA
TSS	5	27	16	<1	210	28	NA	NA

Notes

^a Values that are less than the detection limit are listed as "<" detection limit value.

^b Data collected from January 2010 through December 2010. Grab samples were collected for laboratory analysis.

^c Minimum values represent the lowest detected concentration or the method detection limit if the analyte was not detected at least once during the sampling period.

^d Maximum values represent the highest detected concentration during the period of sample collection.

^e Average values represent the calculated mean of concentrations during the sampling period. If the analyte was not detected, half of the detection limit was used to calculate the average.

^f Discharge Criteria and basis for maximum and average values are listed in the *Request for Approval of Modification to the Removal Action at the Leviathan Mine* memorandum (U.S. EPA, 2008).

Abbreviations

AS = Aspen Seep

ASB = Aspen Seep Bioreactor

mg/L = milligrams per liter

NA = Not applicable

TDS = Total dissolved solids

TSS = Total suspended solids

TABLE 4

2010 MONTHLY SUMMARY OF INFLUENT FLOW
AND TREATED VOLUME FROM CHANNEL UNDERDRAIN AND DELTA SEEP

Leviathan Mine Site
Alpine County, California

Month in 2010	CUD: Average Monthly Flow (Weir Box) (gpm) ^a	CUD: Estimated Volume per Month (Weir Box) (gallons) ^a	CUD: Estimated Average Monthly Flow (Totalizer) (gpm) ^b	CUD: Estimated Volume Collected (Totalizer) (gallons) ^b	DS: Estimated Average Monthly Flow (Totalizer) (gpm) ^c	DS: Estimated Volume Collected (Totalizer) (gallons) ^c
January	12.3	549,264	---	---	---	---
February	15.3	615,957	---	---	---	---
March	20.9	931,080	---	---	---	---
April	27.9	1,203,947	---	---	---	---
May ^e	36.4	1,623,671	28.5	1,273,347	14.5	648,854
June	34.9	1,506,402	34.8	1,553,435	12.7	566,098
July	31.4	1,402,110	34.4	1,535,655	12.8	573,307
August	25.8	1,153,022	26.2	1,169,835	11.1	496,779
September	21.8	942,458	22.1	956,310	10.0	430,814
October	10.0	445,045	18.8	837,374	10.1	450,116
November ^f	10.0	430,301	17.2	107,123	9.6	7,044
December	10.9	487,959	---	---	---	---
Total Estimated Volume	---	11,291,214	---	7,433,079	---	3,173,012
Approximate Initial Volume in Pond 4 on May 2, 2010^d					431,091	
Total CUD & DS Volume Collected and Treated^{e,f}					10,606,091	
Total Volume Treated^g					11,037,182	

Notes

^a Data Source: U.S. Geological Survey (USGS). Data for 2010 is provisional and subject to correction.

^b Data Source: Field recording of volume totalizer reading on influent flow meter from the CUD collection and conveyance, average monthly flow calculated from daily volume recording. Total estimated volume per month calculated from volume totalizer readings.

^c Data Source: Field recording of volume totalizer reading on influent flow meter from the DS collection and conveyance, average monthly flow calculated from daily volume recording. Total estimated volume per month calculated from volume totalizer readings.

^d Volume in Pond 4 estimated from USGS gauge height of 6.54 feet on May 2, 2010, minus the estimated accumulated sludge volume.

^e CUD & DS collection began on May 6, 2010.

^f CUD & DS collection ceased on November 1, 2010. CUS restored November 5, and captured through November 9, 2010 for lime utilization purposes.

^g Treated volume includes initial Pond 4 volume and captured DS & CUD flows.

Abbreviations

CUD = Channel Underdrain

--- = not applicable or not collected

DS = Delta Seep

TABLE 5

**2010 MONTHLY SUMMARY OF
INFLUENT FLOW AND TREATED VOLUME FROM ASPEN SEEP**

Leviathan Mine Site
Alpine County, California

Month^a	Minimum Daily Flow (Weir Box) (gpm)	Maximum Daily Flow (Weir Box) (gpm)	Average Monthly Flow (gpm)	Total Estimated Volume Treated per Month (Gallons)^b
January	4.9	5.4	5.1	227,956
February	4.9	5.4	5.1	207,145
March	4.8	7.5	5.6	249,155
April	6.1	22.4	9.6	415,388
May	10.3	12.7	11.0	490,878
June	9.7	10.6	10.1	437,815
July	8.0	9.8 ^c	8.6 ^c	384,486
August	7.7	9.0	8.0	356,444
September	8.1	9.1	8.5	305,062
October	5.1	5.9	5.4	241,056
November	4.9	5.4	5.2	209,664
December	4.9	5.3	5.1	153,306
Total Estimated Treated Volume (gallons)			3,678,354	

Notes

^a Data Source: U.S. Geologic Survey (USGS). Data for 2010 is provisional and subject to correction.

^b Total estimated volume per month is calculated from the average monthly flow multiplied by the number of operating minutes in each month. This volume differs from the volume calculated by the effluent flow meter.

^c USGS reported a maximum daily flow of 61.5 gpm on July 25, 2010, no storm events or abnormal operations were recorded on this day therefore, this data point is not used in the maximum daily flow and average monthly flow for the month of July 2010.

Abbreviations

ASB = Aspen Seep Bioreactor

gpm = gallons per minute

TABLE 6

SUMMARY OF 2010 WASTE MANIFESTS
 Leviathan Mine Site
 Alpine County, California

Date Removed from Site	Profile Number	Manifest Number	Source	Waste Description	Classification	California Hazardous Waste Code	Container Size	Weight ^a (tons)
7/22/2010	070128301-766	1301533	Aspen Seep	Lead plates and sulfuric acid	RCRA Hazardous Waste, Solid	181	30-gal	2.54
7/22/2010	070170388-0	1301533	Pond 4	Flammables not otherwise specified	RCRA Hazardous Waste, Solid	141	55-gal	
7/22/2010	070170388-0	1301533	Pond 4	Waste Aerosols	RCRA Hazardous Waste, Solid	141	30-gal	
7/22/2010	07128300-1560	1301534	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
7/22/2010	070128300-1550	1301534	Aspen Seep	Personal Protective Equipment	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	Pond 4	Lime, Iron Precipitate, and Sediment from cleaning the Pond 4 LTS tanks and conveyance pipe.	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	Pond 4	Lime, Iron Precipitate, and Sediment from cleaning the Pond 4 LTS tanks and conveyance pipe.	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	Pond 4	Lime, Iron Precipitate, and Sediment from cleaning the Pond 4 LTS tanks and conveyance pipe.	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	Pond 4	Lime, Iron Precipitate, and Sediment from cleaning the Pond 4 LTS tanks and conveyance pipe.	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	Pond 4	Lime, Iron Precipitate, and Sediment from cleaning the Pond 4 LTS tanks and conveyance pipe.	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070128300-1560	1301534	HDS Plant	Personal Protective Equipment	Non-RCRA Hazardous Waste, Solid	181	55-gal	
7/22/2010	070137747-1384	SYB1005	HDS Plant	50 gallons of oily water from HDS Plant Clarifier	Non Hazardous	221	55-gal	
7/22/2010	070137747-1384	SYB1005	HDS Plant	20 gallons of oily water from HDS Plant Clarifier	Non Hazardous	221	55-gal	
7/22/2010	070137747-1384	SYB1005	HDS Plant	200 gallons of oily water from HDS Plant Clarifier	Non Hazardous	221	275-gal	
7/29/2010	07015443-0	SYB0903	ASB SDB Pilot Test	Treatment Solids (Sludge)	Non Hazardous	-	25 cy	--

TABLE 6

SUMMARY OF 2010 WASTE MANIFESTS
 Leviathan Mine Site
 Alpine County, California

Date Removed from Site	Profile Number	Manifest Number	Source	Waste Description	Classification	California Hazardous Waste Code	Container Size	Weight ^a (tons)
7/29/2010	07015443-0	SYB0903	ASB SDB Pilot Test	Treatment Solids (Sludge)	Non Hazardous	-	25 cy	<1
8/17/2010	070153317-0	1301542	HDS Plant	Treatment Solids (Sludge)	Non-RCRA Hazardous Waste, Solid	181	25 cy	10.39
8/17/2010	070153317-0	1301543	HDS Plant	Treatment Solids (Sludge)	Non-RCRA Hazardous Waste, Solid	181	25 cy	9.87
9/7/2010	070171469-0	1301566	Aspen Seep	Pipe with scale	Non-RCRA Hazardous Waste, Solid	181	25 cy	0.68
10/11/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	10.95
10/11/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	9.68
10/11/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	10.72
10/11/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	10.23
10/11/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	10.3
10/13/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	8.8
10/13/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	8.37
10/13/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	8.6
10/13/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	9.28
10/13/2010	070154443-0	SYB1007	ASB Centrifuge	Treatment Solids (Sludge)	Non Hazardous	-	20 cy	7.86
10/21/2010	070137747-1384	SYB1001	ASB Centrifuge	Rinse Water for filter bins	Non Hazardous	-	2 - 275-gal	11.57
10/21/2010	070137747-1384	SYB1001	ASB Centrifuge	Rinse Water for filter bins	Non Hazardous	-	2 - 55-gal	
10/27/2010	070153317-0	SYB1001 ^b	HDS Plant	Treatment Solids (Sludge)	Non-RCRA Hazardous Waste, Solid	181	25 cy	11.99
10/27/2010	070153317-0	SYB1001 ^b	HDS Plant	Treatment Solids (Sludge)	Non-RCRA Hazardous Waste, Solid	181	25 cy	11.57

TABLE 6

SUMMARY OF 2010 WASTE MANIFESTS
 Leviathan Mine Site
 Alpine County, California

Date Removed from Site	Profile Number	Manifest Number	Source	Waste Description	Classification	California Hazardous Waste Code	Container Size	Weight ^a (tons)
11/17/2010	070128300-1560	1301604	HDS Plant	Personal Protective Equipment	Non-RCRA Hazardous Waste, Solid	181	2 - 55-gal	0.59
11/17/2010	070128300-1560	1301604	Aspen Seep	Personal Protective Equipment	Non-RCRA Hazardous Waste, Solid	181	30-gal	
11/17/2010	070128300-1560	1301604	Aspen Seep	Personal Protective Equipment	Non-RCRA Hazardous Waste, Solid	181	55-gal	
11/17/2010	070128300-1560	1301604	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
11/17/2010	070128300-1560	1301604	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
11/17/2010	070128300-1560	1301604	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
11/17/2010	070128300-1560	1301604	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
11/17/2010	070128300-1560	1301604	HDS Plant	Spent pH buffer solution / iron reagent waste	Non-RCRA Hazardous Waste, Solid	181	5-gal	
11/17/2010	070128300-1560	1301607	Pond 4	Used rags with oil and diesel fuel	Non-RCRA Hazardous Waste, Solid	221	30-gal	
11/17/2010	070131570-363	1301607	Aspen Seep	Used Coolant	Non-RCRA Hazardous Waste, Solid	181	55-gal	
11/17/2010	070127425-371	1301607	Pond 4	HCl with absorbent	Hazardous Waste	181	5-gal	
11/17/2010	070128301-766	1301607	Aspen Seep	PPE and rags with battery acid	Hazardous Waste	181	5-gal	
11/17/2010	070153317-0	SYB1001 ^b	HDS Plant	Treatment Solids (Sludge)	Non-RCRA Hazardous Waste, Solid	181	25 cy	9.33
11/17/2010	070127120-55	SYB1005	Pond 4	Spent florescent light bulbs (13)	Non Hazardous	181	4' length box	--

Notes

^a Weight for treatment-generated solids recorded at disposal facility: US Ecology in Beatty, Nevada.

^b Treatment solids were transported off-site to U.S. Ecology under a non-hazardous waste manifest even though the Waste Material Off-Site Shipment Notification Letter dated November 16, 2010, stated that the waste Material California characteristic hazardous waste based on the STLC nickel concentration. As explained in the letter, the waste Material is not listed as a hazardous waste under federal or California law, therefore a non-hazardous waste manifest was accepted for the waste to be transported and disposed of at US Ecology.

Abbreviations

-- = Not Measured
 ASB = Aspen Seep bioreactor
 cy = cubic yards
 gal = gallons
 HDS = High density sludge
 RCRA = Resource Conservation and Recovery Act
 SDB = Sludge Drying Bins

TABLE 7

**2010 HIGH DENSITY SLUDGE TREATMENT SYSTEM AND
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM SAMPLING AND ANALYSIS SCHEDULE**

Leviathan Mine Site
Alpine County, California

Sample Location	Sample ID Designation	Field Parameters	Sample Frequency	Analytical Compliance Parameters	Sample Frequency
High Density Sludge Treatment System Sample and Analysis Schedule					
CUD Flow & DS Flow	CUD & DS	pH, Temp, Conductivity, DO, ORP, Flow rate	1 time per month	Acidity, alkalinity, hardness, Ca, Cl, Mg, sulfate, TDS, TSS, and target metals ^a	1 time per month
HDS Influent	HDSINF	pH, Temp, Conductivity, DO, ORP, Flow rate	Weekly	Acidity, alkalinity, hardness, Ca, Cl, Mg, sulfate, TDS, TSS, and target metals ^a	1 time per month
HDS Effluent	HDSEFF	pH, Temp, Conductivity, DO, ORP, Flow rate, Fe ²⁺ /Fe _{total} (Hach)	2 times daily during discharge & Fe ²⁺ /Fe _{total} 1 time daily during discharge ^c	Acidity, alkalinity, hardness, Ca, Cl, Mg, sulfate, TDS, TSS, and target metals ^a	1 time per month ^b
Aspen Seep Bioreactor System Sample and Analysis Schedule					
Bioreactor Influent (USGS Weir)	ASPINF	pH, Temp, Conductivity, DO, ORP, Flow rate	Weekly/ Monthly ^d	Acidity, alkalinity, hardness, Ca, Cl, Mg, sulfate, TDS, TSS, and target metals ^a	2 times per month during the ARWS & 1 times monthly during the LAS
Bioreactor Effluent	ASPEFF	pH, Temp, Conductivity, DO, ORP, Flow rate, Fe ²⁺ /Fe _{total} (Hach)	Weekly/ Monthly ^d	Acidity, alkalinity, hardness, Ca, Cl, Mg, sulfate, TDS, TSS, and target metals ^a	2 times per month during the ARWS & 1 times monthly during the LAS
Process Locations ^e	May include MH1, MH2, MH3, MH4, MH5, and/or MH7	pH, Temp, Conductivity, DO, ORP, Fe ²⁺ /Fe _{total} (Hach)	Weekly/ Monthly ^d	Acetate, ammonia and total Kjeldahl nitrogen, dissolved organic carbon, ethanol, nitrate/nitrite, sulfate, sulfide, phosphorus (denoted Enhanced Sampling)	weekly during the ARWS & 1 times monthly during the LAS
Sludge Sampling and Analysis Schedule					
Pond 4 Sludge	PND4 SLDG	NA	NA	TCLP, STLC, TTLC, SPLP, moisture content, paste pH, percent solids	Prior to sludge disposal
Bioreactor Sludge	ASPSLG	NA	NA	TCLP, STLC, TTLC, SPLP, moisture content, paste pH, percent solids	Prior to sludge disposal

TABLE 7

**2010 HIGH DENSITY SLUDGE TREATMENT SYSTEM AND
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM SAMPLING AND ANALYSIS SCHEDULE**

Leviathan Mine Site
Alpine County, California

Notes

- ^a Target metals are those listed in Table 8 to be measured as dissolved except selenium.
- ^b Sample to consist of a composite of three grab samples, each grab sample field-filtered and acid fixed as required promptly after collection.
- ^c Field iron speciation/concentration measured once daily during discharge, time of day for iron sample collection was varied throughout the week.
- ^b Higher frequency of sample collection occurs during the ARWS and is reduced to monthly measuring during the LAS. Iron speciation frequency varies at process locations.
- ^e Process monitoring locations vary with system configuration, data collected from process locations were used to optimize the system performance.

Abbreviations

ARWS = Atlantic Richfield Work Season

AS = Aspen Seep

ASPEFF = Treated water from the Aspen Seep Bioreactor as it flows out of the system.

ASPINF = Untreated water from Aspen as it flows into the bioreactor system.

Ca = Calcium

Cl = Chlorine

CUD = Channel Underdrain

DO = Dissolved oxygen content

DS = Delta Seep

EFF= Effluent

Fe²⁺/Fe_{total} = Iron (II) / total iron

LAS = Limited Access Season

Mg = Magnesium

MH = Man Hole

NA = Not applicable

P4 = Pond 4

SPLP = Synthetic precipitation leaching procedure

STLC = Soluble threshold limit concentration

TCLP = Toxicity characteristic leaching procedure

TDS = Total dissolved solids

Temp = Temperature

TSS = Total suspended solids

TTLC = Total threshold limit concentration UNR

USGS = U.S. Geological Survey

TABLE 8

2010 HIGH DENSITY SLUDGE TREATMENT SYSTEM AND ASPEN SEEP BIOREACTOR TREATMENT SYSTEM SUMMARY OF LABORATORY ANALYTICAL METHODS FOR AQUEOUS-AND SOLID-PHASE PARAMETERS

Leviathan Mine Site
Alpine County, California

Parameter	Sample Preparation or Type	Method ^a	Minimum Method Detection Limit	Units
AQUEOUS PHASE SAMPLES				
Anions and General Parameters				
Acidity	Unfiltered	EPA 305.1	10.0	mg/L (as CaCO ₃)
Alkalinity	Unfiltered	EPA 310.1	5.0	mg/L (as CaCO ₃)
Chloride	Unfiltered	EPA 300.0	5.0	mg/L
Sulfate	Unfiltered	EPA 300.0	10.0	mg/L
Hardness	Unfiltered	EPA 6010B - Calculation	1.0	mg/L (as CaCO ₃)
Total Dissolved Solids	Unfiltered	EPA 160.1/2540 C	10.0	mg/L
Major Cations and Trace Metals				
Aluminum	Filtered & Unfiltered	EPA 6010B	0.08	mg/L
Arsenic	Filtered & Unfiltered	EPA 6020	0.005	mg/L
Calcium	Filtered & Unfiltered	EPA 6010B	0.5	mg/L
Cadmium	Filtered & Unfiltered	EPA 6020	0.001	mg/L
Chromium	Filtered & Unfiltered	EPA 6020	0.005	mg/L
Copper	Filtered & Unfiltered	EPA 6020	0.005	mg/L
Iron	Filtered & Unfiltered	EPA 6010B	0.1	mg/L
Lead	Filtered & Unfiltered	EPA 6020	0.001	mg/L
Magnesium	Filtered & Unfiltered	EPA 6010B	0.5	mg/L
Nickel	Filtered & Unfiltered	EPA 6020	0.005	mg/L
Selenium	Unfiltered	EPA 6020	0.02	mg/L
Zinc	Filtered & Unfiltered	EPA 6020	0.005	mg/L
Enhanced Sampling at ASB				
Acetate	Filtered	EPA 300.0 modified	0.41	mg/L
Ethanol	Filtered	EPA 8260B	0.10	mg/L
Phosphorous	Filtered	EPA 200.7/EPA6010B	0.02	mg/L
Ammonia-NH ₃	Filtered	SM-4500-NH ₃	0.10	mg/L
Nitrate-N	Filtered	EPA 300.0	0.10	mg/L
Nitrite-N	Filtered	EPA 300.0	0.10	mg/L
Nitrate/Nitrite-N	Unfiltered	EPA 300.0 - Calculation	0.10	mg/L
Nitrogen, Total Kjeldahl (TKN)	Filtered	EPA 351.2/351.3	0.05	mg/L
Dissolved Organic Carbon	Filtered	SM5310B	0.5	mg/L
Sulfide	Unfiltered	SM4500-S D	1.0	mg/L
SOLID PHASE SAMPLES				
TCLP Metals	Sludge	EPA 1311/6010B/7470A	Varies	mg/L
SPLP Metals	Sludge	EPA 1312/6010B//7470A	Varies	mg/L
TTLC Metals (total metals)	Sludge	EPA 3050B (wet weight) /6010B//7471A	Varies	mg/kg
STLC Metals (Cal WET)	Sludge	CCR Title 22 WET/6010B//7470A	Varies	mg/L
Paste pH	Sludge	SW-845 9045A	NA	standard units
Density	Sludge/Slurry	ASTM E1109 (ASTM D2937)	0.1	g/cc
Percent Solids	Sludge/Slurry	EPA 160.2	0.1	%
Moisture Content	Sludge/Slurry	ASTM 2450B/SM 2540G	0.1	%

Notes

^a Major cations and trace metals analyses may be performed using either U.S. EPA Method 6010B (ICP) or U.S. EPA Method 6020 (ICP-MS), depending on the requirements of the project-specific work plan.

Abbreviations

CaCO₃ = Calcium Carbonate
g/cc = grams per cubic centimeter
mg/kg = milligrams per kilograms
mg/L = milligrams per liter
NA = Not applicable

SPLP = Synthetic precipitation leaching procedure
STLC = Soluble threshold limit concentration
TCLP = Toxicity characteristic leaching procedure
TTLC = Total threshold limit concentration
WET = Waste extraction test

TABLE 9

SUMMARY OF 2010 HIGH DENSITY SLUDGE TREATMENT SYSTEM DISCHARGE EVENTS

Leviathan Mine Site
Alpine County, California

Month	Dates of Discharge	Estimated Volume of Discharge (gallons)^a
May ^b	5/3 to 5/31	2,105,410
June	6/1 to 6/30	2,114,486
July	7/1 to 7/6	350,496
	7/9 to 7/10	76,176
	7/13 to 7/30	1,257,264
August	8/3 to 8/31	1,817,408
September	9/1 to 9/30	1,407,398
October	10/1	23,633
	10/6 to 10/8	196,874
	10/11 to 10/15	316,859
	10/18 to 10/22	332,744
	10/26 to 10/30	339,384
November	11/1 to 11/4	305,781
	11/9 to 11/11	151,201
Total 2010 Volume Discharged	---	10,795,114

Notes

^a Discharge volume is calculated from the influent flow totalizer when the HDS Treatment Plant discharge valve is open.

^b The HDS Treatment Plant began start-up operations on April 28, 2010, treated water was not discharged until May 3, 2010.

Abbreviations

CUD = Channel Underdrain
DS = Delta Seep
HDS = High Density Sludge

TABLE 10

SUMMARY OF 2010 COSTS INCURRED

Leviathan Mine Site
Alpine County, California

Task Description	2010 Expenditure
Project Management and Health and Safety, Security, and Environment (HSSE) Oversight	
Project Compliance, Reporting, Project Management and HSSE Oversight	\$3,227,000
Pond 4 Activities	
Lime Treatment System (LTS) Tank Cleaning	\$29,000
Pond 4 Liner Maintenance	\$2,000
Sludge Management Evaluation	\$5,000
Pond 4 LTS Total =	\$36,000
Channel Underdrain & Delta Seep Treatment Related Activities	
Spring Commissioning	\$211,000
Operation and Maintenance	\$1,538,000
Sludge Management and Disposal	\$63,000
System Winterization	\$125,000
Engineering Support and System Improvements	\$236,000
HDS Treatment System Total =	\$2,173,000
Aspen Seep Treatment Related Activities	
Operations and Maintenance	\$999,000
Sludge Management and Disposal	\$585,000
Engineering Support and System Improvements	\$302,000
ASB Treatment System Total =	\$1,886,000
Site Access	
Site Setup and Maintenance	\$519,000
Leviathan Mine Road Maintenance	\$774,000
Site Access Total =	\$1,293,000
Grand Total =	\$8,615,000

Note

Expenditures were rounded to \$1,000 increments.