Weekly Activities Summary
Amendment 2 - Full Scale Field Demonstration
Interim Combined Acid Drainage Treatability Study Work Plan
Leviathan Mine Site
Alpine County, California

Week: July 5 – July 14, 2017

The following text describes field demonstration activities conducted during July 5 through July 14, 2017, to implement Amendment No. 2 to the Interim Combined Acid Drainage Treatability Investigation Work Plan, which Atlantic Richfield submitted to U.S. EPA on March 31, 2017.

Interim Combined Treatment Operations

Operational Summary

- During the period of July 5 through July 6 Atlantic Richfield transferred Upper Pond Water (approximately 69,000 gallons from Pond 1 and 147,000 gallons from Pond 2S) to Pond 4 and mixed it with existing CUD and DS water to create a blend with an acidity of approximately 2,800 mg/L. On Friday, July 7, Atlantic Richfield began HDS Treatment and discharge of the combined water at variable flow rates while monitoring plant operations and conducting the initial sampling event. Atlantic Richfield also installed a 1-inch PVC diversion line from Leviathan Creek, and transferred approximately 1,600 gallons of water to Pond 4 to aid in optimizing the blended acidity of the combined acid drainage sources prior to treatment. The HDS Treatment Plant remained in operation treating the blended water at 70 gpm over the weekend (7/8 and 7/9) with no issues.

- On Monday, July 10, at approximately 12:20 pm, Atlantic Richfield increased the HDS Treatment Plant influent flow to 143 gpm. The HDS Treatment Plant operated within the target criteria as specified in the work plan. Temporary interruptions during this shakedown-time period are detailed below. Operations overall were steady, with low turbidity and stable pH control. The HDS treatment plant was operated at 143 gpm until July 14, 2017.

- Atlantic Richfield continued transferring water from Pond 2S and mixing with CUD, DS and Leviathan Creek water (as necessary) in Pond 4 to maintain the 2,600 – 2,900 acidity target. The flow rate for the Leviathan Creek diversion line was modulated between 0 and approximately 11 gpm.

HDS Treatment Plan Downtime Summary

- The HDS Treatment Plant was placed in recycle mode returning effluent to Pond 4 upon initial start-up for approximately 30 minutes on July 7, 2017. The HDS Treatment Plant began initial discharge to Leviathan Creek on July 7, 2017, at approximately 9:53 am.

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- HDS Treatment Plant operations experienced the following short-term interruptions between July 7 and July 14:
    - Approximately 60 minutes on July 7, 2017, due to equipment maintenance;
    - Approximately six minutes on July 11, 2017, due to a sump pump alarm; and
    - Approximately 11 hours and 25 minutes on July 13 and 14, 2017, due to a loss of communication with the Reactor Tank pH probe.

- The HDS Treatment Plant was placed in recycle mode returning effluent to Pond 4 following a short-term shutdown for approximately 65 minutes on July 14, 2017.

- The remainder of the time, the HDS Treatment Plant was discharging to Leviathan Creek.

- Capture and conveyance of the CUD and DS were maintained uninterrupted throughout this period.

Sampling Summary

- HDS Treatment Plant ICT sampling was performed on July 7, 2017, following initial HDS Treatment Plant discharge.

- Daily sampling was performed July 10 through July 14, 2017, during the first week of HDS Treatment Plant combined treatment operations per the U.S. EPA's request in their April 25, 2017, concurrence letter.

- July 7 and 10, 2017, sample results are presented in Table 1. July 11, 12, 13, and 14, 2017, sample results are not yet available. A summary of the HDS Treatment Plant effluent field monitoring is presented in Table 2. Flow volumes recorded for the Channel Underdrain, Delta Seep, Leviathan Creek diversion, Upper Pond water transfer, and treated water discharged from the HDS Treatment Plant are included in Table 3.

- The measured nickel concentrations in the July 7 and July 10, 2017 effluent samples were 0.15 and 0.1 mg/L, which slightly exceed the Average MRAM discharge criteria (0.094 mg/L) but not the Maximum MRAM discharge criteria (0.84 mg/L). Following receipt of the sample results, the pH treatment setpoint in the HDS Treatment Plant was increased from 8.0 to 8.3 to improve nickel removal. Sample results are not yet available for the time period following adjustment to the pH treatment setpoint.

TABLE 1
HDS TREATMENT PLANT - PRELIMINARY INTERIM COMBINED TREATMENT SAMPLE RESULTS
Draft - Provisional Data

Parameter	Basis	July 07, 2017 HDSICT-1 HDS Influent mg/L	July 07, 2017 HDSICT-2 HDS Effluent mg/L	July 10, 2017 UPCS-2 mg/L	July 10, 2017 HDSICT-1 HDS Influent mg/L	July 10, 2017 HDSICT-2 HDS Effluent mg/L	Maximum Discharge Criteria[2] (mg/L)	Average Discharge Criteria[2] (mg/L)
pH (s.u.)[1]	Field	2.76	7.64	2.42	2.68	7.91	6.0 - 9.0	-
Aluminum	Dissolved	250	<1.0	490	160	0.57	4	2.0
Arsenic	Dissolved	2.6	0.0017	7.6	0.68	0.0019	0.340	0.15
Cadmium	Dissolved	0.037	0.00028 J	0.089	0.022	<0.001	0.0090	0.004
Calcium	Dissolved	300	1000	190	310	1000	-	-
Chloride	Total	6.7	2.6	4.9	2.9	1.9	-	-
Chromium	Dissolved	0.38	<0.002	1.4	0.3	0.00091 J	0.970	0.31
Copper	Dissolved	1	0.0014 J	3.2	0.81	0.0038	0.026	0.016
Hardness	Dissolved	1000	2800	740	1000	2800	-	-
Iron	Dissolved	610	<1.0	960	440	<0.50	2	1.0
Lead	Dissolved	0.0021	<0.001	<0.02	<0.005	<0.001	0.136	0.005
Magnesium	Dissolved	80	110	61	78	77	-	-
Nickel	Dissolved	2.5	**0.15**	5.8	3.1	**0.1**	0.84	0.094
Selenium	Total	0.0089	0.002	0.012	0.0084	0.0019 J	NP	0.005
Sulfate	Total	4100	3000	5900	3000	2700	-	-
Zinc	Dissolved	0.73	0.0064 J	1.4	0.71	0.0028 J	0.21	0.21
Acidity	Total	2800	<2.0	5300	2200	<2.0	-	-
Alkalinity (Bicarbonate)	Total	<4.8	37	<4.8	<4.8	13	-	-
Alkalinity (Carbonate)	Total	<2.4	<2.4	<2.4	<2.4	<2.4	-	-
Alkalinity (Hydroxide)	Total	<1.4	<1.4	<1.4	<1.4	<1.4	-	-
Alkalinity (Total)	Total	<4.0	30	<4.0	<4.0	11	-	-
Total Dissolved Solids	Total	5800	4400	9100	4700	4500	-	-
Total Suspended Solids	Total	44	36	28	110	16	-	-

Notes:
1. pH values are field measurements and are reported in standard units.
2. 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
< - Constituents that were not detected are listed as "<" and the reporting limit is shown.
J - Results noted with "J" are an estimated value or were less than the reporting limit but greater than or equal to the method detection limit.
mg/L - milligrams per liter
NP - Not Promulgated
s.u. - standard unit

TABLE 2
HDS TREATMENT PLANT - EFFLUENT FIELD MONITORING
Draft - Provisional Data

Date	Time	HDS Treatment Plant Effluent Field Monitoring			
		Flow (gpm)	pH (s.u.)	Dissolved Iron (mg/L)	Turbidity (NTU)
07/07/17	9:25 AM	40.0	7.21	0.02	4.7
07/08/17	7:35 AM	70.0	7.50	0.44	3.8
07/09/17	7:50 AM	70.0	7.60	0.07	4.0
07/10/17	8:00 AM	70.0	7.31	0.17	15.3
07/10/17	4:30 PM	143.0	7.62	0.09	1.7
07/11/17	6:20 AM	143.0	8.05	0.58	3.0
07/11/17	6:10 PM	143.0	8.12	0.65	1.7
07/12/17	6:15 AM	143.0	7.99	0.06	2.32
07/12/17	6:00 PM	143.0	8.11	0.09	2.83
07/13/17	6:10 AM	143.0	7.96	0.11	2.64
07/13/17	6:10 AM	143.0	7.95	0.11	2.64
07/13/17	6:00 PM	143.0	8.01	0.04	2.47
07/14/17	6:50 AM	143.0	7.71	0.04	4.9
07/14/17	7:00 PM	143.0	8.35	0.57	2.1

Notes
[1] HDS Treatment Plant influent flow rate measurements are calculated from flow totalizer volume measurements.
[2] Effluent pH values are field measurements and are reported in standard units.
[3] Dissolved Iron values are field measurements and are reported in mg/L.
[4] Turbidity values are field measurements and are reported in NTU.

Abbreviations
gpm - gallons per minute
mg/L - milligrams per liter
NTU - Nephelometric Turbidity Units
s.u. - standard unit

TABLE 3
INTERIM COMBINED TREATMENT VOLUMES
Draft - Provisional Data

Date	CUD Collection Volume	DS Collection Volume	Leviathan Creek Diversion Volume	Upper Pond Transfer Volume	Treated Water Discharge from HDS Treatment Plant Recorded Flow[1,2]	
	(gallons)	(gallons)	(gallons)	(gallons)	(gpm)	(gallons)
7/5/2017	68,619	22,957	0	115,540	0	0
7/6/2017	70,136	23,188	0	100,204	0	0
7/7/2017[3]	70,235	22,763	1,619	0	70	56,121
07/08/17	70,331	22,738	0	0	70	100,774
07/09/17	70,411	22,299	0	0	70	100,738
07/10/17	70,542	22,242	0	35,000	143	157,807
07/11/17	70,617	22,112	2,959	39,000	143	204,716
07/12/17	70,413	21,686	0	57,750	143	205,542
07/13/17	70,598	22,402	0	100,800	143	163,548
07/14/17	70,698	22,017	6,591	84,480	143	121,242
Average Flow Rate or Total Discharged	702,600	224,405	11,169	532,774	115.6	1,110,487

Notes

1. Treated Water Discharge recorded flows are calculated from flow totalizer volume measurements.
2. The operational flow rate is reported. Water discharge does not always occur 24 hours per day. The operational flow rate may also vary during the day.
3. Discharge of treated combined water from the HDS Treatment Plant started on July 7, 2017, at approximately 9:53 AM.

Abbreviations

CUD - Channel Underdrain
DS - Delta Seep
HDS - High Density Sludge
gpm - gallons per minute