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July 14, 2016

Arthur Burbank
USDA Forest Service
4350 South Cliffs Dr.
Pocatello, ID 83204

Subject: Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor Pilot Study June 2016 Progress Report

Dear Art,

This progress report summarizes key activities in June 2016 associated with the fluidized bed bioreactor (FBR) pilot study located near Hoopes Spring. This pilot study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring. Operation and monitoring of the pilot study follows the *Pilot Study Work Plan and Sampling and Analysis Plan (Work Plan/SAP), Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor* (prepared by Formation Environmental, dated September 2014, with revised text and tables dated March 5, 2015), along with Work Plan/SAP Addenda 01, 02, and 03 which Simplot submitted to the Agencies (and were subsequently approved) in the summer of 2015, and Addendum 04 submitted to and approved by the Agencies in January 2016.

As noted in previous monthly progress reports, the system was restarted in March 2016 and ran continuously through May 13, when the aeration tank was drained following damage to the aeration diffuser system. The tank was repaired on May 19, and the system was restarted May 20. Due to the system being offline for the week of May 16, Week 7 sampling was delayed by one full week. A weather related power outage on June 12 caused the plant to be shut down. Upon restarting the plant, the influent pump over pressurized the system and caused a rupture disk to fail. This disk was replaced and the plant was restarted. During the week ending June 26, the plant was shut down for 24 hours to repair the aeration diffuser system. After draining the aeration tank, it was determined that the replacement parts were the wrong size. The new parts were not installed, and the system was restarted without issue.

The following sampling events were conducted in June 2016:

- Week 8 sampling on June 1 (focused analyte list);
- Week 9 sampling on June 7 (full analyte list);
- Week 10 sampling on June 15 (focused analyte list);
- Week 11 sampling on June 21 (full analyte list); and
- Week 12 sampling on June 28 (focused analyte list).

Identification of Deliverables and Data Transmittals

At the time of this report, the 12-week performance testing has been completed. Laboratory data for Weeks 7 through 12 have been received. Preliminary laboratory data for the full analyte list are presented in Table 1.1, and data for the focused analyte list are presented in Table 1.2. Field data for Weeks 7 through 10 are presented in Table 2.

There were no outstanding deliverables or transmittals for the month of June.

Upcoming Activities

The following activities associated with the FBR pilot study are planned through August 2016:

- As per the Work Plan/SAP, samples will now be collected every other week (focused analyte list only). This phase of sampling began on July 6.
- The results for Weeks 0-12 will be evaluated as specified in Table 3-3 of the Work Plan/SAP (Addendum 01), and provided to the Agencies for discussion including refinement of the interim water quality target parameters.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

Monty Johnson
Environmental Engineering Manager
J. R. Simplot Company

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Table 1.1
Laboratory Results Full Analyte List

		Week 7		Week 9		Week 11	
	Station >>	Influent	Effluent	Influent	Effluent	Influent	Effluent
	Sample ID >>	SC0516-LSSHS-IN003	SC0516-LSSHS-EF003	SC0616-LSSHS-IN002	SC0616-LSSHS-EF002	SC0616-LSSHS-IN004	SC0616-LSSHS-EF004
	Date >>	5/25/2016	5/25/2016	6/7/2016	6/7/2016	6/21/2016	6/21/2016
Analyte	**Units**						
General Chemistry							
Ammonia as N	mg/L	0.026 U	0.96	0.026 U	1	0.026 U	0.386
Bicarbonate	mg/L	190	200	170	180	190	180
Biochemical Oxygen Demand	mg/L	2 U	2	2 U	7	2 U	2 U
Carbonate	mg/L	1 U	1 U	1 U	1 U	1 U	1 U
Chemical Oxygen Demand	mg/L	5 U	5 U	5 U	5 U	5 U	7
Calcium, Dissolved	mg/L	59.6	59.8	58.2	57.3	62.4	61.6
Magnesium, Dissolved	mg/L	22.2	22.3	21.9	22	23.1	22.8
Potassium, Dissolved	mg/L	0.637	0.554	0.615	0.576	0.702	0.656
Sodium, Dissolved	mg/L	5.46	5.39	5.33	5.56	5.55	5.46
Chloride	mg/L	8.19	15.6	7.9	14.9	6.25	13
Fluoride	mg/L	0.217	0.273	0.265	0.259	0.219	0.196
Hardness	mg/L	240	241	235	234	251	247
Nitrate as N	mg/L	0.39	0.11	0.42	0.03 J	0.38	0.12
Nitrate/Nitrite as N	mg/L	0.393	0.106	0.42	0.0311 J	0.377	0.125
Sulfate as SO4	mg/L	43.3	46.3	42.7	43	34.1	38
Total Alkalinity	mg/L	190	200	170	180	190	180
Total Dissolved Solids	mg/L	292	318	284	284	278	258
Total Organic Carbon	mg/L	0.5 U	0.962 J	0.5 U	0.839 J	0.5 U	0.784 J
Total Phosphorus as P	mg/L	0.025	0.107	0.0411	0.109	0.0265	0.13
Total Sulfide	mg/L	1 U	1 U	1 U	1 U	1 U	1 U
Total Suspended Solids	mg/L	2 U	2 U	2 U	2 U	2 U	2 U
Metals and Metalloids							
Aluminum, Dissolved	mg/L	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum, Total	mg/L	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Antimony, Dissolved	mg/L	0.00009 J	0.00011 J	0.00009 J	0.00015 J	0.0001 J	0.00021 J
Antimony, Total	mg/L	0.0001 J	0.00011 J	0.0001 J	0.00016 J	0.00011 J	0.0002 J
Arsenic, Dissolved	mg/L	0.000398 U	0.000398 U	0.000398 U	0.000398 U	0.000398 U	0.000398 U
Arsenic, Total	mg/L	0.00041 J	0.000398 U	0.00041 J	0.000398 U	0.000398 U	0.000398 U
Barium, Dissolved	mg/L	0.0459	0.0341	0.0486	0.0329	0.0475	0.033
Barium, Total	mg/L	0.0518	0.0377	0.05	0.034	0.0474	0.0339
Beryllium, Dissolved	mg/L	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U
Beryllium, Total	mg/L	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U
Boron, Dissolved	mg/L	0.00854 J	0.0088 J	0.00931 J	0.00982 J	0.00795 J	0.00801 J
Boron, Total	mg/L	0.0131 J	0.0121 J	0.0106 J	0.0107 J	0.0147 J	0.00965 J
Cadmium, Dissolved	mg/L	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U
Cadmium, Total	mg/L	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U
Chromium, Dissolved	mg/L	0.00061 J	0.0000433 U	0.00061 J	0.0000433 U	0.00059 J	0.00006 J
Chromium, Total	mg/L	0.00066 J	0.0000433 U	0.00064 J	0.0000433 U	0.00059 J	0.00006 J
Cobalt, Dissolved	mg/L	0.00009 J	0.00745	0.00008 J	0.00185	0.00011 J	0.00255

Table 1.1
Laboratory Results Full Analyte List

		Week 7		Week 9		Week 11	
	Station >>	Influent	Effluent	Influent	Effluent	Influent	Effluent
	Sample ID >>	SC0516-LSSHS-IN003	SC0516-LSSHS-EF003	SC0616-LSSHS-IN002	SC0616-LSSHS-EF002	SC0616-LSSHS-IN004	SC0616-LSSHS-EF004
	Date >>	5/25/2016	5/25/2016	6/7/2016	6/7/2016	6/21/2016	6/21/2016
Analyte	Units						
Cobalt, Total	mg/L	0.0001 J	0.00818	0.00009 J	0.00194	0.0001 J	0.00252
Copper, Dissolved	mg/L	0.0000418 U	0.0013	0.0000418 U	0.00048 J	0.0000418 U	0.00208
Copper, Total	mg/L	0.0000418 U	0.00136	0.0000418 U	0.0005 J	0.0000418 U	0.00187
Iron, Dissolved	mg/L	0.01 U	0.01 U	0.01 U	0.0232 J	0.01 U	0.0143 J
Iron, Total	mg/L	0.0112 J	0.241	0.114	0.304	0.01 U	0.29
Lead, Dissolved	mg/L	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U
Lead, Total	mg/L	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U
Manganese, Dissolved	mg/L	0.00139	0.0218	0.0102	0.0211	0.00106	0.0216
Manganese, Total	mg/L	0.00153	0.0239	0.0104	0.0224	0.00103	0.0215
Mercury, Dissolved	mg/L	0.000004 U	0.000004 U	0.000004 J	0.000005 J	0.000014 J	0.000012 J
Mercury, Total	mg/L	0.00008 J	0.000093 J	0.000064 J	0.00007 J	0.00009 J	0.000075 J
Molybdenum, Dissolved	mg/L	0.00296	0.00859	0.00282	0.00746	0.00242	0.00787
Molybdenum, Total	mg/L	0.00192	0.00821	0.00184	0.0078	0.00202	0.00778
Nickel, Dissolved	mg/L	0.00022 J	0.0105	0.00042 J	0.0107	0.0005 J	0.0281
Nickel, Total	mg/L	0.00033 J	0.0107	0.00076 J	0.0109	0.00037 J	0.0271
Selenate	mg/L	0.119	0.000631	0.105	0.00005 U	0.101	0.000124 J
Selenite	mg/L	0.00002 U	0.00769	0.00005 U	0.00417	0.00005 U	0.00454
Selenium, Dissolved	mg/L	0.118	0.00853	0.122	0.00496	0.129	0.00733
Selenium, Total	mg/L	0.114	0.00884	0.125	0.00527	0.124	0.00677
Silver, Dissolved	mg/L	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U
Silver, Total	mg/L	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U
Thallium, Dissolved	mg/L	0.00007 J	0.00013 J	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U
Thallium, Total	mg/L	0.00009 J	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U
Uranium, Dissolved	mg/L	0.00143	0.00116	0.00154	0.00154	0.0001 J	0.00122
Uranium, Total	mg/L	0.00156	0.00121	0.00151	0.00159	0.00012 J	0.00121
Vanadium, Dissolved	mg/L	0.00132 J	0.00017 J	0.00138 J	0.00036 J	0.00107 J	0.00026 J
Vanadium, Total	mg/L	0.00153	0.00025 J	0.00147 J	0.00037 J	0.00091 J	0.0003 J
Zinc, Dissolved	mg/L	0.00121 J	0.0135	0.0032 J	0.00474 J	0.00378 J	0.0161
Zinc, Total	mg/L	0.0014 J	0.0144	0.00314 J	0.00506	0.00378 J	0.0156

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 1.2
Laboratory Results Focused Analyte List

		Week 8		Week 10		Week 12	
	Station >>	Influent	Effluent	Influent	Effluent	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN001	SC0616-LSSHS-EF001	SC0616-LSSHS-IN003	SC0616-LSSHS-EF003	SC0616-LSSHS-IN005	SC0616-LSSHS-EF005
	Date >>	6/1/2016	6/1/2016	6/15/2016	6/15/2016	6/28/2016	6/28/2016
Analyte	**Units**						
General Chemistry							
Nitrate as N	mg/L	0.43	0.13	0.41	0.1	0.41	0.13
Total Phosphorus as P	mg/L	0.0377	0.185	0.0166	0.148	0.0315	0.121
Total Sulfide	mg/L	1 U	1 U	1 U	1 U	1 U	1 U
Metals and Metalloids							
Selenium, Dissolved	mg/L	0.127	0.00987	0.134	0.00543	0.128	0.00707
Selenium, Total	mg/L	0.134	0.0101	0.138	0.00542	0.132	0.00707

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 2
Field Water Quality Data

Week 7	Station >>	Influent	Effluent
	Sample ID >>	SC0516-LSSHS-IN003	SC0516-LSSHS-EF003
	Date >>	5/25/2016	5/25/2016
Analyte	Units		
Dissolved Oxygen	mg/L	9.51	8.6
ORP	mV	185	114
pH	SU	7.72	7.57
SC	umhos/cm	479	489
Temperature	C	12.77	12.47
Turbidity	NTU	1.1	5.8

Week 8	Station >>	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN001	SC0616-LSSHS-EF001
	Date >>	6/1/2016	6/1/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.77	8.01
ORP	mV	116	160
pH	SU	7.65	7.23
SC	umhos/cm	473	485
Temperature	C	12.56	13.08
Turbidity	NTU	1.2	6.2

Week 9	Station >>	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN002	SC0616-LSSHS-EF002
	Date >>	6/7/2016	6/7/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.61	7.26
ORP	mV	128	179
pH	SU	7.68	7.36
SC	umhos/cm	461	472
Temperature	C	12.63	13.16
Turbidity	NTU	1.2	7.3

Week 10	Station >>	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN003	SC0616-LSSHS-EF003
	Date >>	6/15/2016	6/15/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.59	7.42
ORP	mV	211	168
pH	SU	7.26	6.92
SC	umhos/cm	478	495
Temperature	C	13.29	12.97
Turbidity	NTU	1.6	7.4