DOWNEY | BRAND
ATTORNEYS LLP

Nicole E. Granquist
ngranquist@downeybrand.com
916/520-5369 Direct
916/520-5769 Fax

621 Capitol Mall, 18th Floor
Sacramento, CA 95814
916/444-1000 Main
916/444-2100 Fax
downeybrand.com

October 30, 2013

VIA U.S. MAIL AND ELECTRONIC MAIL

Ms. Dyan Whyte
Assistant Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Re: *Quarterly Report (3rd Qtr) for Selenium Study – June 27, 2013 Amended Water Code section 13267 Order, Order No. R2-2013-1005-A1, Directives 9 and 10*

Dear Ms. Whyte:

Enclosed, pursuant to the Regional Water Quality Control Board, San Francisco Bay Region's, ("Regional Water Board") June 27, 2013 amended Water Code section 13267 Order, Order No. R2-2013-1005-A1, ("Order"), Lehigh Southwest Cement Company ("Lehigh") timely provides and encloses the Third Quarter Report and associated documents for the Selenium Study undertaken pursuant to Directives 9 and 10 of the Order.

If you or your staff have any questions regarding the above report or enclosed documents, please do not hesitate to contact me or Greg Knapp at Lehigh, or Mike Bryan and Ben Giudice of RBI.

Very truly yours,

Nicole E. Granquist

Cc: Brian Thompson, Regional Water Quality Control Board, San Francisco Bay Region
Greg Knapp, Director Environmental Region West, Lehigh
Scott Rickman, Regional Counsel, Lehigh Hanson

ROBERTSON - BRYAN, INC.
Solutions for Progress

9888 Kent Street • Elk Grove CA 95624
Phone: (916) 714-1801 • Fax: (916) 714-1804

TECHNICAL MEMORANDUM

Date:	October 30, 2013
To:	San Francisco Bay Regional Water Quality Control Board
From:	Ben Giudice, Ph.D., P.E.; Paul Bedore, M.S.; Michael Bryan, Ph.D.
Cc:	Greg Knapp, Nicole Granquist
On Behalf of:	Lehigh Southwest Cement Company
Project:	Permanente Quarry and Cement Plant Selenium Impact Assessment Study
Subject:	Quarter 3, 2013 Report

Introduction

This memo summarizes results from samples collected in Quarter 3, 2013, pursuant to the Permanente Quarry Cement Plant Selenium Impact Assessment Study (Study). The Study Work Plan was initially submitted on May 17, 2013, and was a requirement of the 13267 Investigative Order, No. R2-2013-1005, issued in January 2013 by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) and finalized in a June 27, 2013 amended 13267 Investigative Order, No. R2-2013-1005-A1 (Order). The final Study Plan was submitted on July 11, 2013. This report satisfies one of the quarterly reporting requirements in section 10b of the Order. Laboratory reports containing the data are included as attachments.

Summary of Sampling Events in this Quarter (Q3 2013)

Permanente and Stevens Creeks were sampled on September 4, 2013. The weather was overcast in the morning, turning to clear and sunny by noon. The event commenced at 10:30 a.m. and was complete by 5:00 p.m. Details of the sampling event are as follows.

- The background station, Wild Violet Creek (WVC), was dry; however a pool was present in the streambed at the confluence of Wild Violet and Permanente Creeks. There was no flow into or out of Pond 13 or Pond 14, and there was no flow at PER070. In Rancho San Antonio Open Space at PER080 (West Permanente Creek), flow was intermittent (i.e., portions of the streambed were dry, and portions were wet) and pools were present. Flow was estimated, since the water level was too shallow to permit a measurement to USGS standards (i.e., < 1 inch). Downstream of the Open Space, PER035, PER045, and STE040 were dry, while the sites closest to San Francisco Bay (PER010, STE020, and STE010) were flowing. Thus, Permanente Creek and the Quarry discharge were hydrologically disconnected from Pond 13, Pond 14, PER010, STE020, and STE010.

- Water samples were collected at Pond 13, Pond 14, PER080, PER010, STE020, and STE010.
- Sediment samples were collected at WVC, Pond 13, Pond 14, PER060, PER045, PER035, PER010, STE020, and STE010. A field duplicate (FD) sediment sample was collected at Pond 13 and Pond 14 (and analyzed for total-Se, grain size, SO_4^{2-}, and TOC).
- No flow measurements were taken, but flow was estimated at PER080 for reference.
- pH and DO loggers that had been deployed in Pond 13 on July 9 were retrieved on September 4.

Issues Encountered in Sampling/Analysis

Water samples at the locations closest to San Francisco Bay (PER010 and STE010) had low electrical conductivities indicative of freshwater (929 and 1580 µs/cm, respectively). This was similar to the previous event in July, when it was assumed that these sites would be brackish, based on their elevation relative to the tidal range present in South San Francisco Bay, adjacent saltwater marsh vegetation (STE010 only), and the lack of any known freshwater inputs upstream of these sites and downstream of the dry areas upstream. It is now apparent that water at these sites is primarily emergent groundwater at low tide. The groundwater elevation in the Santa Clara Plain is between 60 and 90 feet above msl, while PER010, STE010, and STE020 are at approximately 8, 4, and 10 feet above msl, respectively. PER010 and STE010 were visited at high tide on September 13, 2013. The visit coincided with a high tide of 5.6 ft above MLLW, which was the lower of the two high tides occurring that day (high-high tide was 7.1 ft). The electrical conductivity of water at STE010 suggested that the site was brackish under high tide (~24,000 µs/cm at mid-channel, max depth, and ~6,000 µs/cm along the bank and near the water surface). At high tide PER010 had a conductivity of ~900 µs/cm, similar to measurement taken during the previous sampling event.

Loggers to measure pH, DO, and temperature that had been deployed in Pond 13 on July 9 were retrieved on September 4. The loggers were mounted on a post that was driven into the bottom of the pond. Because the quarry was not dewatering for much of July and August, the water level in Pond 13 dropped following the deployment, and the loggers were in air above the level of the water starting on approximately July 20. Although this is less than the 30 days of continuous monitoring specified in the work plan, pH was very stable around 8.0-8.2, temperature was fairly stable and fluctuated according to ambient air temperature patterns, and DO was high (> 10 mg/L) and had daily fluctuations expected in a pond that contains algae and decomposition of organic material. The data is shown in Figure 1 and Figure 2 in a subsequent section. Loggers were cleaned, maintained, and redeployed on September 13. To avoid future similar problems, loggers were attached to a buoy that could float up and down with the changing water level in the pond (see Figure A11 in the Photo Log section).

Deviations from Work Plan

The following summarizes all deviations from either (1) the Final Study Work Plan submitted on July 11, 2013, or (2) corrective actions noted in the previous quarterly report (Q2 2013).

- Sediment particle size was measured by the sieve method (ASTM D422 M). As the Q2 2013 report indicated, sediment particle size was intended to be measured with the laser

light scattering method (ASTM D4464 M), and the mis-communication with the lab, which resulted in this deviation, will be corrected in subsequent sampling events.

Data

Measurements taken in the field, including flow, pH, temperature, etc., are reported in Appendix B. Selenium concentrations measured in water and sediment samples is provided in Appendix C. Other constituents that were measured in water and sediment samples have been reported in Appendix D. While grain size has not be reported in the appendices, all of the data from the July 9 and September 4, 2013 sampling events, including sediment grain size, has been provided in an electronic resource accompanying this memo.

Water Samples

- Chlorophyll *a* concentrations were low or below the reporting limit at all sites, except at PER010, where the concentration was 0.12 mg/L.
- Hardness ranged from 359-602 mg/L as $CaCO_3$, with the highest concentrations found in Pond 13 and Pond 14.
- Sulfate concentrations were 420 and 430 mg/L as SO_4 at Pond 13 and Pond 14, respectively. Other stations ranged from 41-130 mg/L as SO_4.
- Total alkalinity was lowest in Ponds 13 and 14, and ranged from 130-360 mg/L as $CaCO_3$ across all sample sites.
- TOC ranged from 1.38 to 6.33 mg/L, and was highest in Ponds 13 and 14 (5.87 and 6.33 mg/L, respectively).
- TSS levels were highest at STE010 (2800 mg/L). Across all other sites, levels ranged from below the method detection limit of 0.30 mg/L at Pond 13 to 8.8 mg/L at PER080.
- Total Se levels in water were greatest at Pond 13 (6.82 µg/L). Pond 14 had a lower concentration of 2.27 µg/L. STE020 and STE010 exhibited concentrations of 2.92 and 2.63 µg/L, respectively. All other sites were < 1 µg/L.
- Dissolved Se made up 53-97% of the total Se.
- Se(IV) was the predominant measured Se species in Pond 13 and Pond 14, while Se(VI) was the predominant Se species at sites downstream of Lehigh, which were hydrologically disconnected from the sites at Lehigh. SeCN was not detected above the method detection limit of 0.003 µg/L.

Sediment

- The sulfate concentration at WVC was 17 mg/kg. Ponds 13 and 14 exhibited very high sulfate at 1600 and 1900 mg/kg, respectively (field duplicates at both locations showed 1200 mg/kg). Downstream of Pond 14, sediment sulfate ranged from 60-300 mg/kg, except STE010, which had 780 mg/kg.
- Total Se (dw basis) in sediment was highest in Pond 13, and was 14.0 mg/kg (the Field Duplicate sample of Pond 13 had 12.4 mg/kg). Pond 14 was also high, at 11.2 mg/kg (the field duplicate of Pond 14 had 8.73 mg/kg). All other sites had total Se of < 2 mg/kg.

Loggers

As mentioned above, pH was very stable around 8.0-8.2, temperature was fairly stable and fluctuated according to ambient air temperature patterns, and DO was high (> 10 mg/L) and had daily fluctuations expected in a pond that contains algae and decomposition of organic material. The data is shown in Figure 1 and Figure 2.

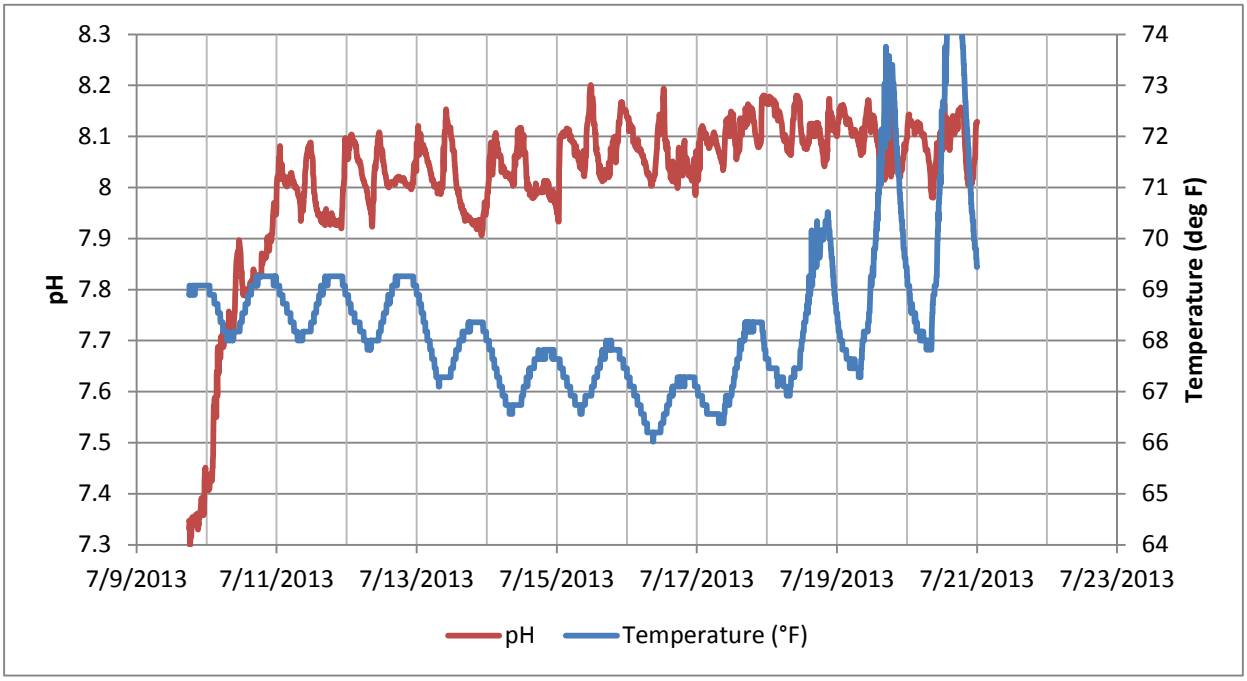


Figure 1. pH and temperature in Pond 13 from the time logging started at 18:00 on 7/9/13 until end of 7/20/13. Around that time, the pond level dropped below the level of the loggers and future data was invalid. The initial pH readings (until approximately the start of 7/11/13) are believed to be in error and related to a time of equilibration of the logger. pH of a grab sample on 7/9/13 at approximately 12:00 was 8.12. Temperature readings after 7/17/13 show larger fluctuations because the sensor was very near the surface of the water.

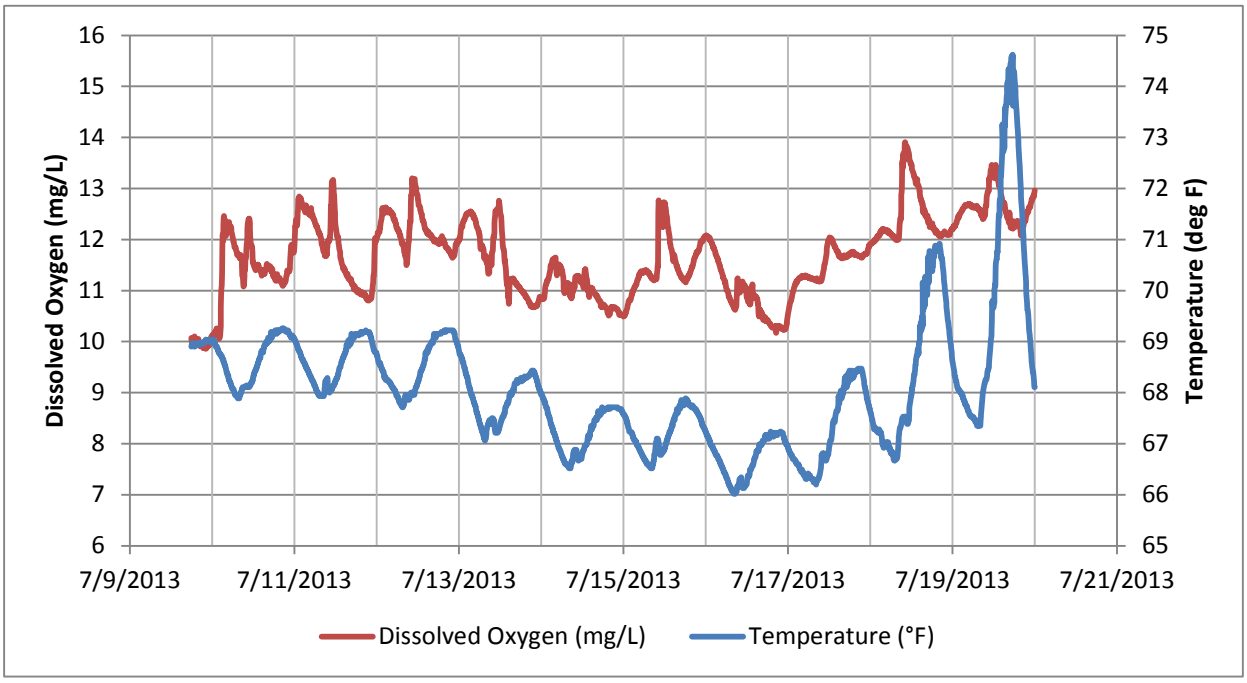


Figure 2. Dissolved oxygen (DO) and temperature in Pond 13 from the time logging started at 18:00 on 7/9/13 until end of 7/19/13. Around that time, the pond level dropped below the level of the loggers and future data was invalid. Temperature readings after 7/17/13 show larger fluctuations because the sensor was very near the surface of the water.

Quality Assurance/Quality Control

The following summarizes quality assurance/quality control issues.

Water samples

- No field duplicates or field blanks of water were collected.
- Recovery of calcium in one of the matrix spikes (MS) was 240% for one batch of samples from the study. This is similar to the QA/QC encountered in the previous event. In both events, the spike concentration was very low compared to the native sample concentration, inflating recoveries due to random error. The sample used for the MS for this analytical batch was not from this study. The other matrix spike, matrix spike duplicate, laboratory control spike, and laboratory control spike duplicate were within the recovery control limits. Based on investigation of these results, no action was taken or additional flags/qualifiers placed on the data from this study.

Sediment samples

- The RPD of field duplicate Pond 13 and Pond 14 samples for total Se was 8% and 22%, respectively. These RPDs met the MQO of 25%.

Appendix A

Photo Log

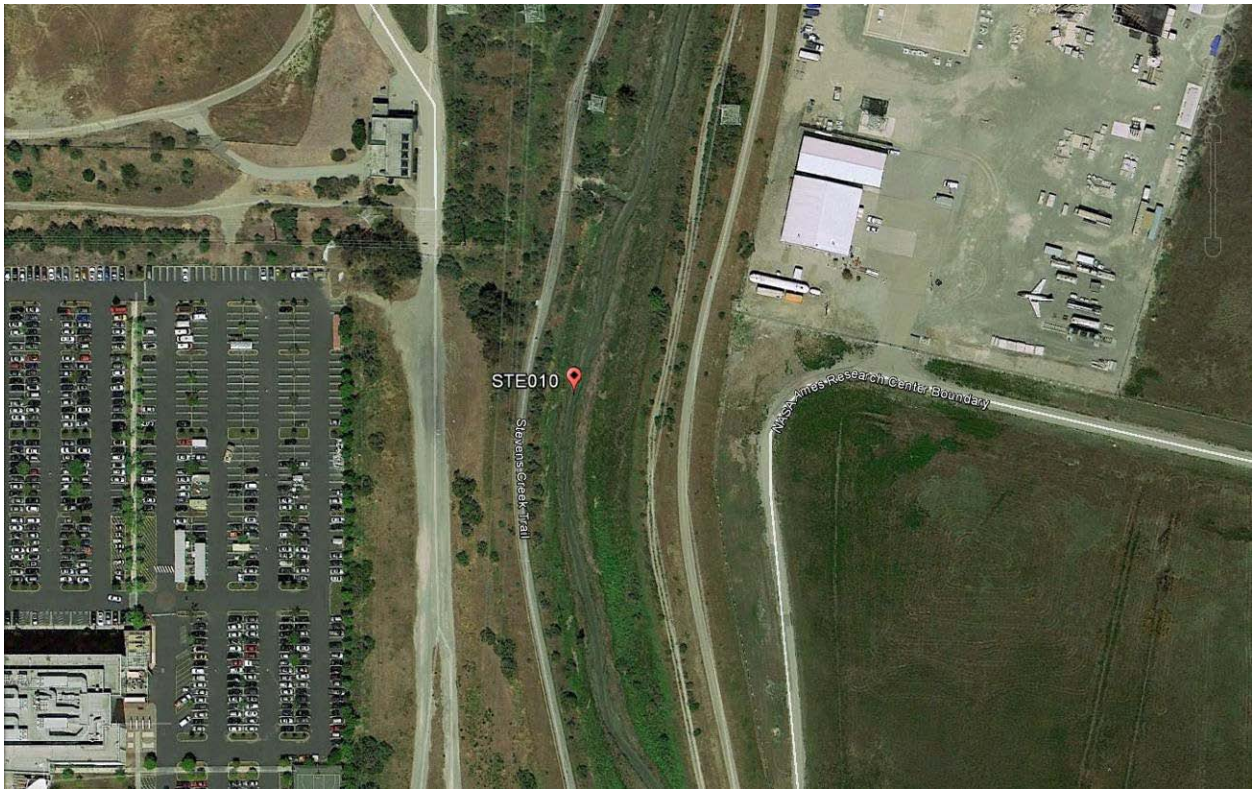


Figure A 1. STE010 sampling station on Stevens Creek.

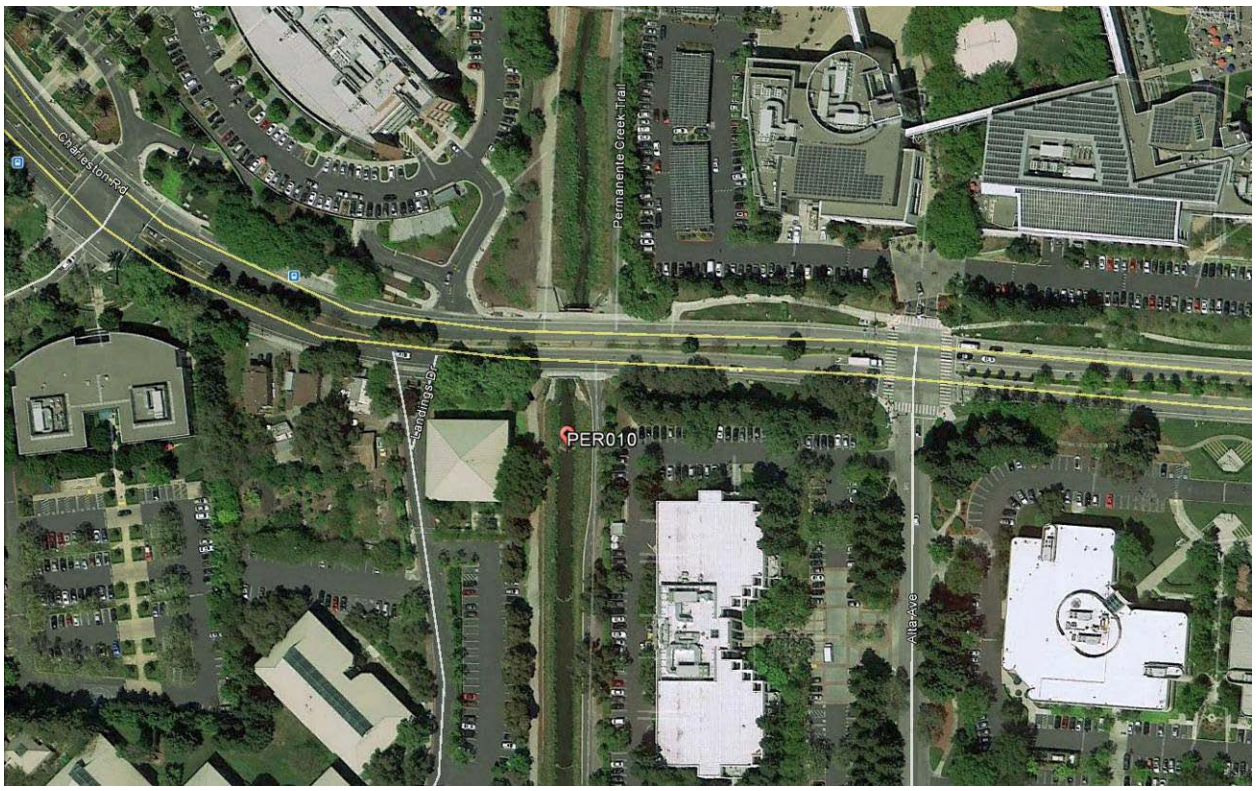
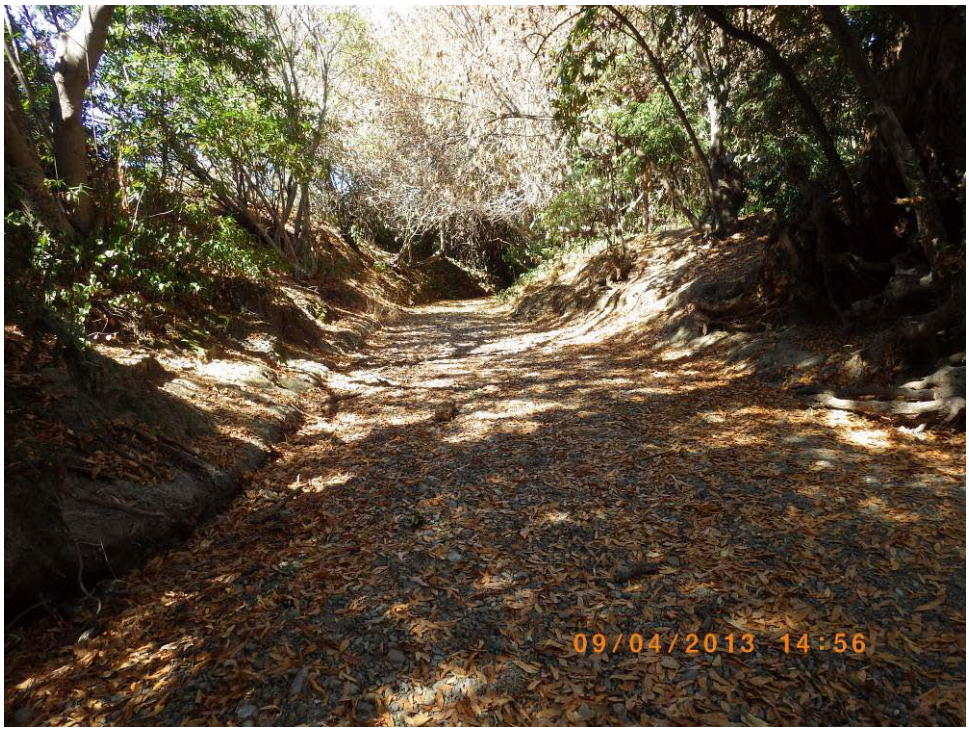


Figure A 2. PER010 sampling station on Permanente Creek.

Figure A 3. PER035 sampling station on Permanente Creek.

Figure A 4. STE020 sampling station on Stevens Creek.



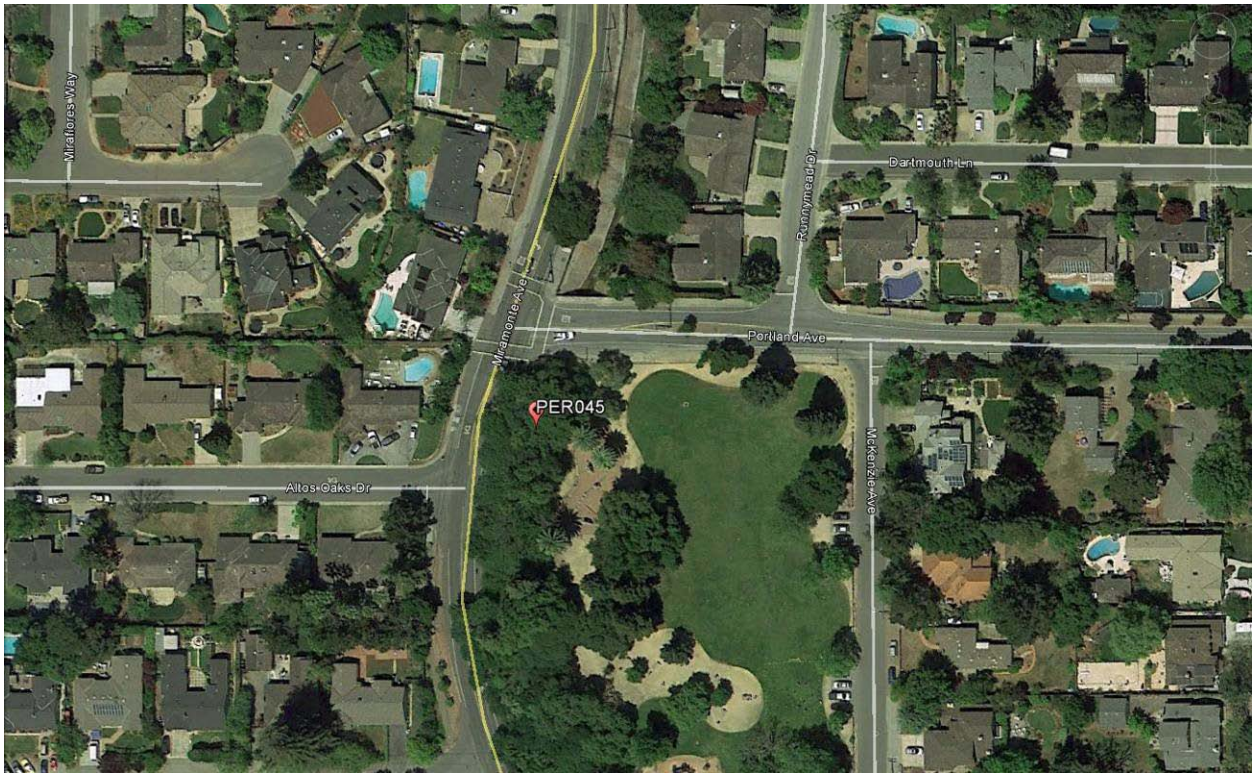


Figure A 5. PER045 sampling station on Permanente Creek.

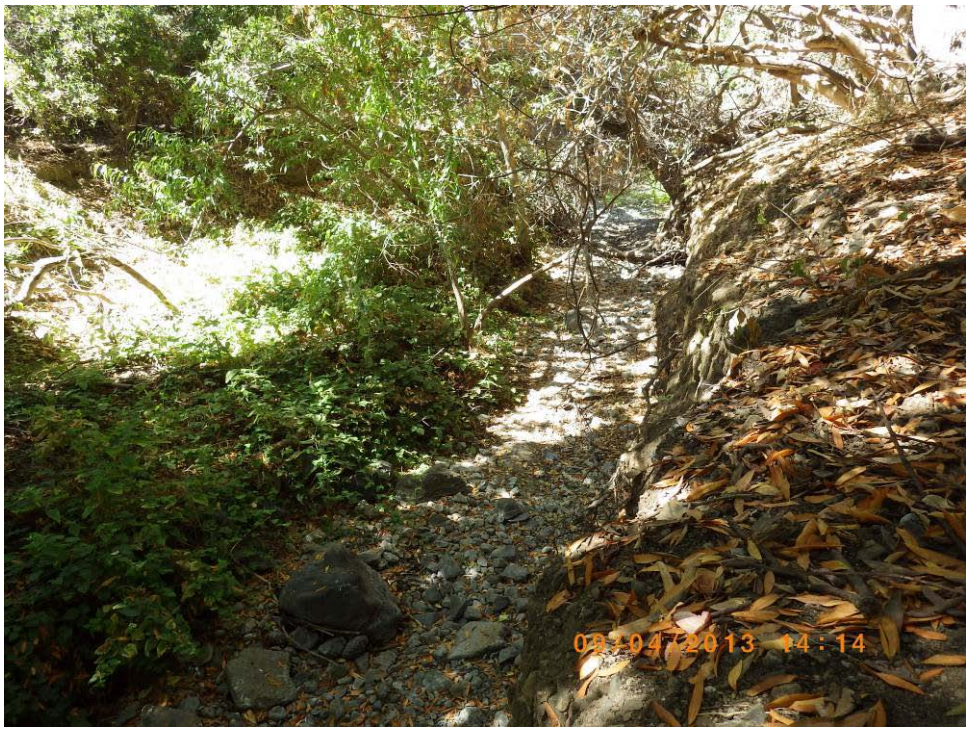


Figure A 6. PER060 sampling station on Permanente Creek.

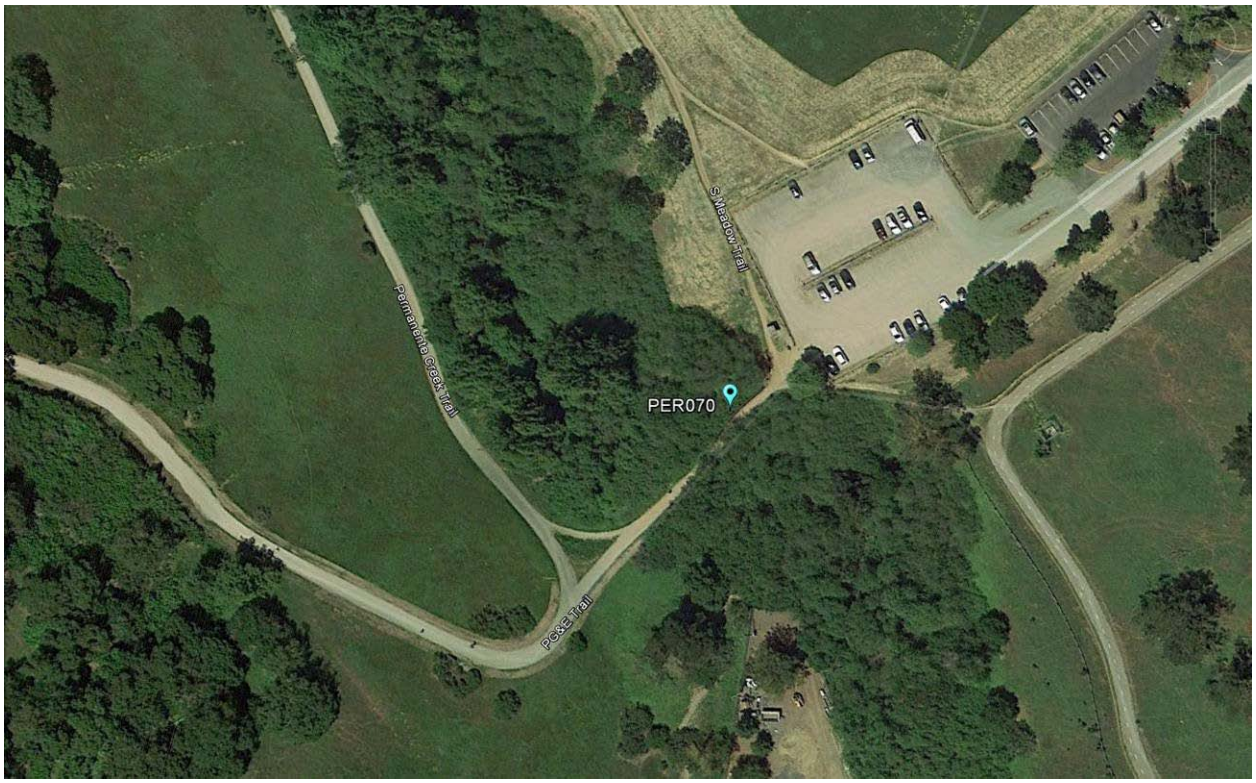


Figure A 7. PER070 sampling station on Permanente Creek.

Figure A 8. PER080 sampling station on Permanente Creek.

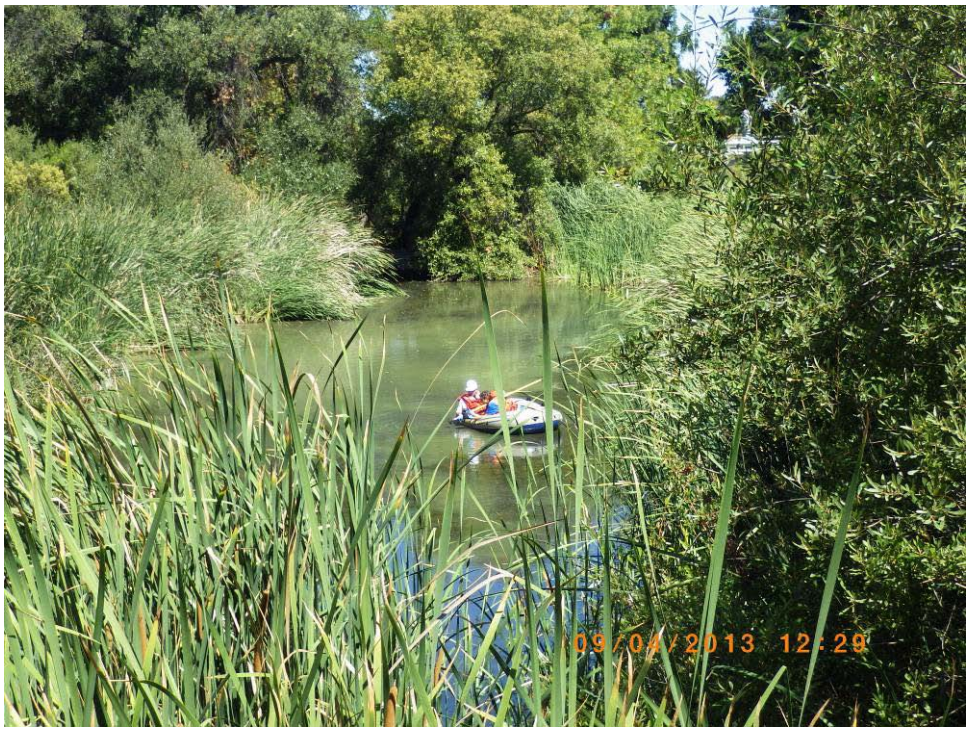


Figure A 9. Pond 14 sampling station.

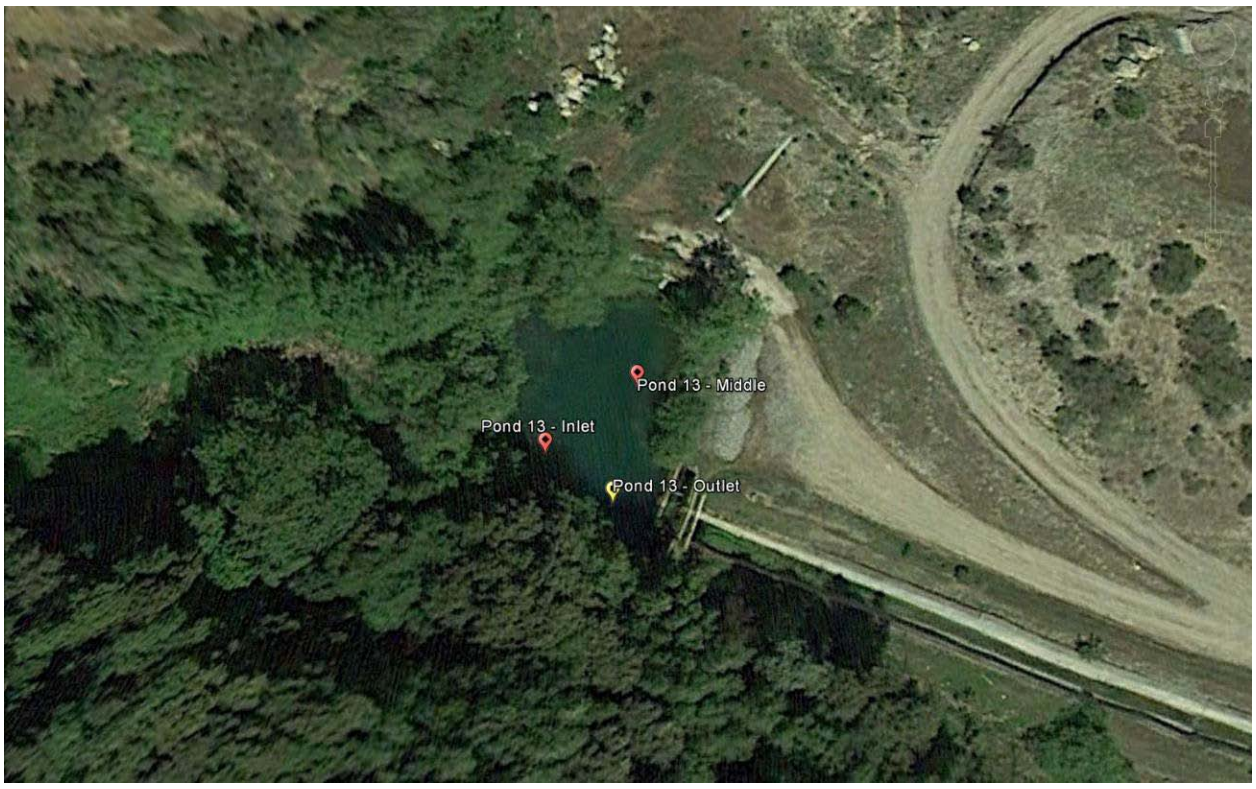


Figure A 10. Pond 13 sampling station.

Figure A 11. Pond 13 pH and DO logger deployment on September 13, 2013.

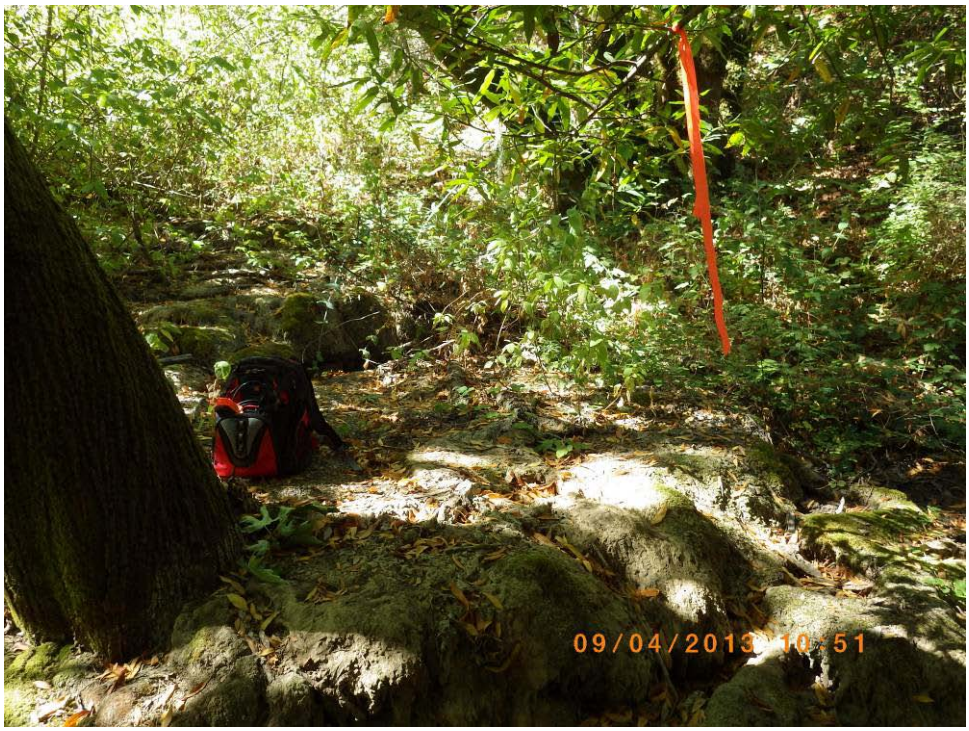


Figure A 12. WVC sampling station.

Appendix B

Field Data

Table 1. Field Measurements and Data Collected on July 9, 2013.

Sample ID	Date Collected	Begin Time	End Time	Flow Condition	Water Collected	Sediment Collected	Continuous Water Column	Flow Measured	Flow (cfs)	pH	Temp (°C)	EC (µS/cm)	DO (mg/L)	DO (%)	ORP (mV)	Notes
WVC	7/9/2013	11:45	11:57	No Flow	No	Yes	--	--	--	--	--	--	--	--	--	No water at sampling site.
Pond 13	7/9/2013	11:00	13:00	Flow	Yes	Yes	pH & DO	Yes	0.42	8.12	25.1	1065	10.45	126.8	128	Abundant submerged and emergent macrophyte and algae
Pond 14	7/9/2013	13:40	13:45	No Flow	Yes	--	--	No	--	7.65	24.0	1179	7.04	83.8	145	Abundant emergent macrophytes and algae.
PER 080	7/9/2013	14:50	15:05	Flow	Yes	--	--	Yes	0.06	7.84	18.7	847	8.13	87.4	169	Low flow, water/flow is intermittent along reach.
PER 070	7/9/2013	14:10	14:20	Flow	Yes	--	--	--	--	8.40	20.2	1245	9.02	99.6	155	
PER 060	7/9/2013	15:20	--	Flow	Yes	Yes	--	Yes	0.07	7.48	18.5	1275	4.98	53.3	177	Intermittent low flow, pools.
PER 045	7/9/2013	16:20	16:30	No Flow	No	Yes	--	No	--	--	--	--	--	--	--	Streambed was completely dry. Coarse gravel substrate.
PER 035	7/9/2013	16:46	16:55	No Flow	No	Yes	--	No	--	--	--	--	--	--	--	Streambed was completely dry. Coarse/sandy substrate.
HAL 010	7/9/2013	--	--	--	No	--	--	No	--	--	--	--	--	--	--	Site not visited.
PER 010	7/9/2013	17:20	17:35	Flow	Yes	Yes	--	--	--	8.21	28.8	1008	18.42	238.9	151	Copious algae, some floating macrophytes.
STE 040	7/9/2013	--	--	No Flow	No	--	--	No	--	--	--	--	--	--	--	Streambed was dry.
STE 020	7/9/2013	18:10	18:20	Flow	Yes	Yes	--	No	--	8.04	24.0	945	8.29	98.5	158	Clear flowing water, approx. 1 foot deep. Abundant floating aquatic vegetation.
STE 010	7/9/2013	18:51	19:00	Flow	Yes	Yes	--	--	--	8.14	23.4	1372	7.86	92.4	155	Tide out, channel extremely soft sediment/mud.

-- No data to report.

Table 2. Field Measurements and Data Collected on September 4, 2013.

Sample ID	Date Collected	Begin Time	End Time	Flow Condition	Water Collected	Sediment Collected	Continuous Water Column	Flow Measured	Flow (cfs)	pH	Temp (°C)	EC (µS/cm)	DO (mg/L)	DO (%)	ORP (mV)	Notes
WVC	9/4/2013	10:55	11:05	No Flow	No	Yes	--	--	--	--	--	--	--	--	--	WVC was dry. Permanente Creek was dry upstream of WVC, but wet downstream.
Pond 13	9/4/2013	10:30	11:32	No Flow	Yes	Yes	pH & DO	No	--	8.10	22.3	1091	11.85	137.1	133	Pond is low ~4 ft below dam level. Loggers are in air ~2-3 ft above water level. Sediment is black, anoxic.
Pond 14	9/4/2013	12:05	12:56	No Flow	Yes	Yes	--	No	--	7.62	23.6	1369	4.44	52.2	151	No flow into pond. Water level is low. Abundant submerged algae and emergent vegetation. Extremely strong sulfide smell
PER 080	9/4/2013	13:47	14:00	Flow	Yes	--	--	No	Est. 0.04 cfs	8.14	18.7	829	8.42	94.1	159	Very low flow.
PER 070	9/4/2013	13:30	13:34	No Flow	No	--	--	--	--	--	--	--	--	--	--	No flow.
PER 060	9/4/2013	14:10	14:20	No Flow	No	Yes	--	No	--	--	--	--	--	--	--	No flow.
PER 045	9/4/2013	14:50	14:55	No Flow	No	Yes	--	No	--	--	--	--	--	--	--	Dry. No flow.
PER 035	9/4/2013	15:10	15:15	No Flow	No	Yes	--	No	--	--	--	--	--	--	--	Dry. No flow.
HAL 010	9/4/2013	--	--	--	No	--	--	No	--	--	--	--	--	--	--	Site not visited.
PER 010	9/4/2013	14:57	15:20	Flow	Yes	Yes	--	--	--	8.77	27.2	929	28.25	350	135	Copious algae and some macrophytes. Low downstream flow ~1-2 cfs/
STE 040	9/4/2013	15:30	15:35	No Flow	No	--	--	No	--	--	--	--	--	--	--	Dry. No flow.
STE 020	9/4/2013	15:44	16:05	Flow	Yes	Yes	--	No	--	8.11	21.8	975	8.37	96.3	157	Clear and fast moving. Vegetation on banks. Water level visually low with minimal depositional area.
STE 010	9/4/2013	16:25	16:35	Flow	Yes	Yes	--	--	--	8.21	25.2	1580	8.98	109	148	Water is low, sulfide smell. Sediment very fine, mucky.

-- No data to report.

Appendix C

Selenium Data

Table 3. Selenium Results for Water Samples Taken on July 9 and September 4, 2013.

Sample ID	Date Collected	Units	Total Se	Diss. Se	Se(IV)	Se(VI)	SeCN	Additional Se Species (n)
FB	7/9/2013	µg/L	< 0.093 U	< 0.092 U	< 0.021 U	< 0.012 U	< 0.005 U	0 (0)
Pond 13	7/9/2013	µg/L	21.4	21.4	0.881	16.6	< 0.005 U	0.068 (2)
FD Pond 13	7/9/2013	µg/L	20.9	20.8	0.815	16.7	< 0.005 U	0.066 (2)
Pond 14	7/9/2013	µg/L	8.50	8.64	1.49	4.40	< 0.005 U	0.153 (2)
PER 080	7/9/2013	µg/L	0.309 J	0.199 J	0.025 J	0.099 J	< 0.005 U	0 (0)
PER 070	7/9/2013	µg/L	12.9	12.8	0.915	9.59	< 0.005 U	0.033 (2)
PER 060	7/9/2013	µg/L	10.0	10.5	0.059 J	8.47	< 0.005 U	0 (0)
STE 020	7/9/2013	µg/L	2.96	2.57	0.243 J	1.86	< 0.005 U	0.018 (1)
PER 010	7/9/2013	µg/L	0.745	0.587	0.074 J	0.288 J	< 0.005 U	0.014 (1)
STE 010	7/9/2013	µg/L	2.26	1.73	0.248 J	1.01	< 0.005 U	0 (0)
Pond 13	9/4/2013	µg/L	6.82	5.06	1.98	1.68	< 0.003 U	0.329 (1)
Pond 14	9/4/2013	µg/L	2.27	1.36	0.461 J	< 0.012 U	< 0.003 U	0.216 (2)
PER 080	9/4/2013	µg/L	0.58	0.306 J	< 0.064 U	0.146 J	< 0.003 U	0 (0)
STE 020	9/4/2013	µg/L	3.02	2.92	0.223 J	2.28	< 0.003 U	0 (0)
PER 010	9/4/2013	µg/L	1.01	0.692	0.130 J	0.371 J	< 0.003 U	0 (0)
STE 010	9/4/2013	µg/L	3.94	2.63	0.385 J	1.71	< 0.003 U	0 (0)

U = Sample concentration is below the estimated method detection limit (eMDL)

J = Sample concentration is between the eMDL and the reporting limit (RL)

SeCN = Selenocyanate

Additional Se Species = Sum of all additional Se species observed by IC-ICP-MS

n = number of unknown Se species observed

FD = Field Duplicate

Table 4. Selenium Results for Sediment Samples Taken on July 9 and September 4, 2013.

Sample ID	Date Collected	Units	Total Se (WW)	Total Se (DW)	Percent Solids (%)
WVC	7/9/2013	µg/g	0.229	0.258	88.8
Pond 13	7/9/2013	µg/g	5.04	9.68	52.1
FD Pond 13	7/9/2013	µg/g	2.97	5.45	54.6
PER 060	7/9/2013	µg/g	0.683	0.892	76.6
PER 045	7/9/2013	µg/g	0.496	0.505	98.2
STE 020	7/9/2013	µg/g	0.426	0.746	57.0
PER 035	7/9/2013	µg/g	1.58	1.61	97.9
PER 010	7/9/2013	µg/g	0.319	0.490	65.1
STE 010	7/9/2013	µg/g	0.204	0.577	35.4
WVC	9/4/2013	µg/g	0.292	0.312	93.8
Pond 13	9/4/2013	µg/g	6.87	14.0	49.0
FD Pond 13	9/4/2013	µg/g	6.35	12.4	51.1
Pond 14	9/4/2013	µg/g	5.46	11.2	48.9
FD Pond 14	9/4/2013	µg/g	4.20	8.73	48.1
PER 060	9/4/2013	µg/g	1.26	1.48	84.9
PER 045	9/4/2013	µg/g	0.502	0.509	98.5
PER 035	9/4/2013	µg/g	0.895	1.49	60.2
STE 020	9/4/2013	µg/g	0.890	1.87	47.5
PER 010	9/4/2013	µg/g	0.427	0.692	61.6
STE 010	9/4/2013	µg/g	0.241	0.676	35.7

U = Sample concentration is below the estimated method detection limit (eMDL)

J = Sample concentration is between the eMDL and the reporting limit (RL)

WW = Wet Weight (As Received) Basis

DW = Dry Weight Basis

FD = Field Duplicate

Appendix D

Monitoring Data for Other Constituents

WVC Results

Wednesday, October 30, 2013

Date	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	150	8600
9/4/2013	17	16000

Pond 13 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	140	150	41	541	380	ND	1.29	ND	140	27000
9/4/2013	130	130	51	530	420	ND	5.87	ND	1600	39000

Pond 14 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	160	140	48	548	410	ND	2.64	ND		
9/4/2013	240	140	62	602	430	0.029	6.33	1.7	1900	47000

PER080 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)
7/9/2013	320	70	45	360	46	ND	1.71	1.3
9/4/2013	340	69	48	371	41	ND	2.18	8.8

PER070 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)
7/9/2013	180	150	46	573	410	ND	1.28	ND

PER060 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	200	150	50	587	120	ND	0.750	1.9	75	8300
9/4/2013									220	12000

PER045 Results

Wednesday, October 30, 2013

Date	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	19	4200
9/4/2013	60	8100

PER035 Results

Wednesday, October 30, 2013

Date	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	56	28000
9/4/2013	87	11000

PER010 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	300	80	58	440	150	0.012	3.43	1.5	74	9900
9/4/2013	260	64	48	359	130	0.12	4.85	4.0	85	20000

STE020 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	380	100	39	415	100	ND	1.10	1.6	50	7800
9/4/2013	320	92	39	390	100	ND	1.38	3.6	300	25000

STE010 Results

Wednesday, October 30, 2013

Date	Total Alkalinity as CaCO3 (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Hardness as CaCO3 (mg/l)	Sulfate as SO4 (mg/l)	Chlorophyll-a (mg/l)	Total Organic Carbon (mg/l)	Total Suspended Solids (mg/l)	Sediment Sulfate as SO4 (mg/kg)	Sediment TOC (mg/kg)
7/9/2013	360	130	87	680	160	0.015	2.11	540	480	9300
9/4/2013	360	110	50	489	120	0.019	3.18	2800	780	20000