Water Quality Monitoring Report

Sacramento Municipal Utility District

Hydro License Implementation • June 2017 Upper American River Project FERC Project No. 2101





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Acronyms and Abbreviations

Acronym	Definition
ATL	Advisory Tissue Level
CDFW	California Department of Fish and Wildlife
cm	centimeter
°C	degrees Celsius
FERC	Federal Energy Regulatory Commission
m	meter
MDL	Method Detection Limit
mg/L	milligram per liter
mL	milliliter
mm	millimeter
MPN	Most Probable Number
MPSL	Marine Pollution Studies Laboratories, at CDFW Moss
	Landing Marine Laboratories
MRL	Method Reporting Limit
NTU	Nephelometric Turbidity Unit
OEHHA	Office of Environmental Health Hazard Assessment
SFAR	South Fork American River
SMUD	Sacramento Municipal Utility District
s.u.	standard unit of pH
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
UARP	Upper American River Project
ug/g wet	micrograms per gram wet weight
weight	
uS	microsiemens = 10^{-6} siemens, a unit of electrical
	conductance
USFS	U.S. Forest Service



1.0 INTRODUCTION AND BACKGROUND

This Water Quality Monitoring Report (Report) addresses monitoring requirements set forth in Sacramento Municipal Utility District's (SMUD) Water Quality Monitoring Plan (SMUD 2016a). The requirements for this Plan are found in State Water Resources Control Board (SWRCB) Condition 8.A, and U.S. Forest Service (USFS) 4(e) Condition 31.1, located in Appendices A and B, respectively, of the Federal Energy Regulatory Commission's (FERC) Order Issuing New License for the Upper American River Project (UARP), dated July 23, 2014. The Plan was developed by SMUD (2015) in coordination with the Consultation Group and Resource Agencies stipulated in the license (FERC 2014). The plan was revised in 2015 (Revision 1) and again in 2016 (Revision 2) to update the referenced analytical methods for various sub-programs within the plan. At the completion of the first five years of monitoring, SMUD will consult with the SWRCB, Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), USFS, and U.S. Bureau of Land Management (BLM) to determine if the results warrant further modifications to the Water Quality Monitoring Plan (SMUD 2016a).

This report describes the results of the second year (2016) of water quality monitoring of basic *in situ* parameters and bacteria, as well as one year of metals bioaccumulation monitoring, for the UARP. Year 1 (2015) monitoring results for basic *in situ* parameters and bacteria are presented in SMUD (2016b).

SMUD owns and operates the Upper American River Project (UARP) which is licensed by the Federal Energy Regulatory Commission (FERC). The UARP (FERC Project No. 2101) lies within El Dorado and Sacramento counties, primarily within lands of the Eldorado National Forest. The UARP consists of three major storage reservoirs: Loon Lake, Union Valley, and Ice House (with a combined capacity of approximately 379,000 acre-feet), eight smaller regulating or diversion reservoirs, and eight powerhouses. The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

2.0 MONITORING OBJECTIVE

The objective of the 2016 monitoring program was to perform *in situ* water quality and bacteria monitoring in reservoirs and stream reaches of the UARP, in order to meet the objectives and rationale of the SWRCB Water Quality Certification Condition 8.J. Additionally, fish tissues were sampled in 2016 to assess potential bioaccumulation of metals in resident fish within specific UARP reservoirs.

The rationale for water quality monitoring, as described by the SWRCB Water Quality Certification, is as follows:



Water quality monitoring is important for determining compliance with state and federal water quality standards and examining long-term trends in water quality. The frequency of monitoring for any compound can be reduced if shown to be at background or non-detect levels for a statistically significant period of time. Fish sampling for the analysis of metal bioaccumulation allows for an evaluation of health risks to humans and wildlife and creates a long-term data set to detect trends in bioaccumulation through the license term.

3.0 STUDY AREA

The study area included UARP reservoirs and diverted stream reaches. All UARP reservoirs (Rubicon, Buck Island, Loon Lake, Gerle Creek, Ice House, Union Valley, Junction, Camino, Brush Creek, and Slab Creek) were included in the monitoring program except for the relatively small Robbs Peak Forebay (30 acre-feet). [Note: Rockbound Lake, although associated with the UARP, is not included within the FERC-defined UARP boundary.] The diverted stream reaches included in the monitoring program represented all streams and rivers downstream of UARP reservoirs (Figure 3-1).



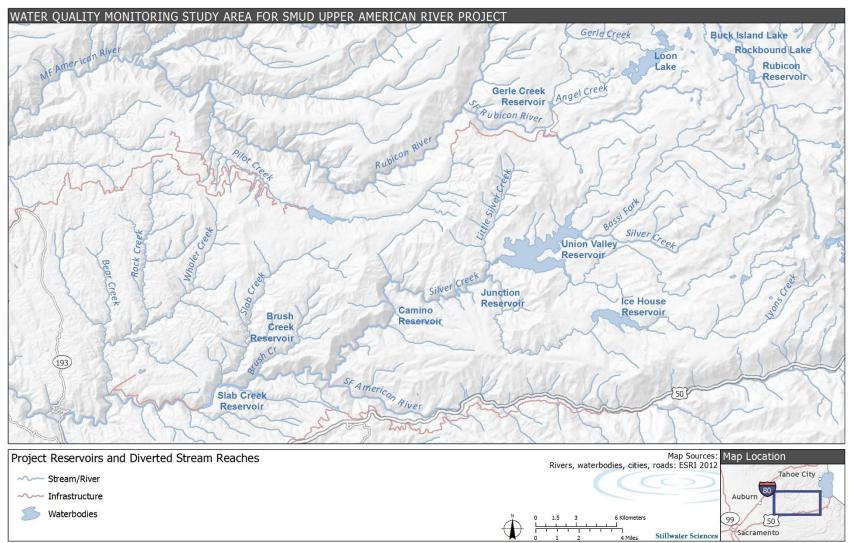


Figure 3-1. Study area for SMUD Upper American River Project in situ, bacteria, and metals bioaccumulation monitoring.



Metals

bioaccumulation

4.0 SAMPLING FREQUENCY AND LOCATIONS

Year 2 (2016) sampling frequency for *in situ* water quality was consistent with winter, spring, summer, and fall monitoring periods designated in the Water Quality Monitoring Plan (SMUD 2016a) (Table 4-1). Required bacteria monitoring was conducted by sampling the middle elevation UARP reservoir (Gerle Creek, Union Valley, Junction, Ice House, Brush Creek, Slab Creek) sites during the 30-day period surrounding 4th of July and sampling the upper elevation UARP reservoir (Loon Lake, Buck Island) sites during the 30-day period surrounding Labor Day. Fish tissue sampling for metals bioaccumulation was conducted one time during August/September at UARP reservoirs identified in the Water Quality Monitoring Plan (Table 4-1).

Table 4 1. Camping requency for <i>m sha</i> water Quanty, Bastena, and Metals Biodocamalation.				
Туре	2016 (Year 2) Frequency			
In situ reservoir	Once in spring – April or May			
In situ reservoir	Once in fall – October or November			
	Once in winter – February			
In situ riverine	Once in spring - May			
in situ iiveillie	Once in summer – August			
	Once in fall – November			
Bacteria	Five samples within 30 days – around 4 th of July			

Five samples within 30 days – around Labor Day

Once in August/September

Table 4-1. Sampling Frequency for in situ Water Quality, Bacteria, and Metals Bioaccumulation.

Specific sampling locations within reservoirs and diverted stream reaches varied depending on the general constituent under study. As specified in the Water Quality Monitoring Plan, *in situ* monitoring occurred at 15 representative reservoir locations (Figures 4-1 and 4-2, Table 4-2) and 19 representative stream reaches (Figures 4-1 and 4-2, Table 4-3), and bacteria sampling occurred at 15 locations (Figures 4-1 and 4-2, Table 4-3). Fish tissue sampling for metals bioaccumulation occurred in 6 reservoirs (Figures 4-1 and 4-2, Table 4-4). Fish tissue sampling for metals bioaccumulation occurred in 6 reservoirs (Figures 4-1 and 4-2, Table 4-3), consistent with the Water Quality Monitoring Plan (Revision 2) (SMUD 2016a). Individual sampling locations within each reservoir are identified in Appendix G.



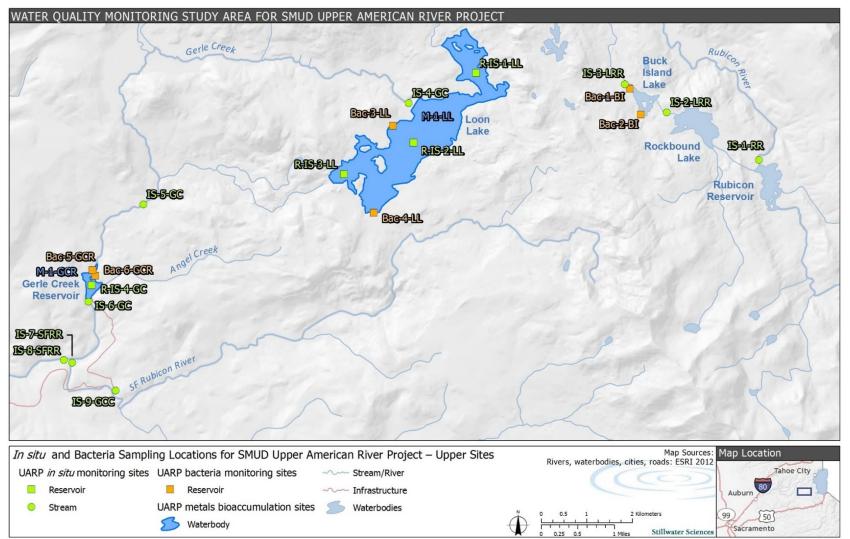


Figure 4-1. In situ water quality, bacteria, and metals bioaccumulation sampling locations for SMUD Upper American River Project – upper sites.



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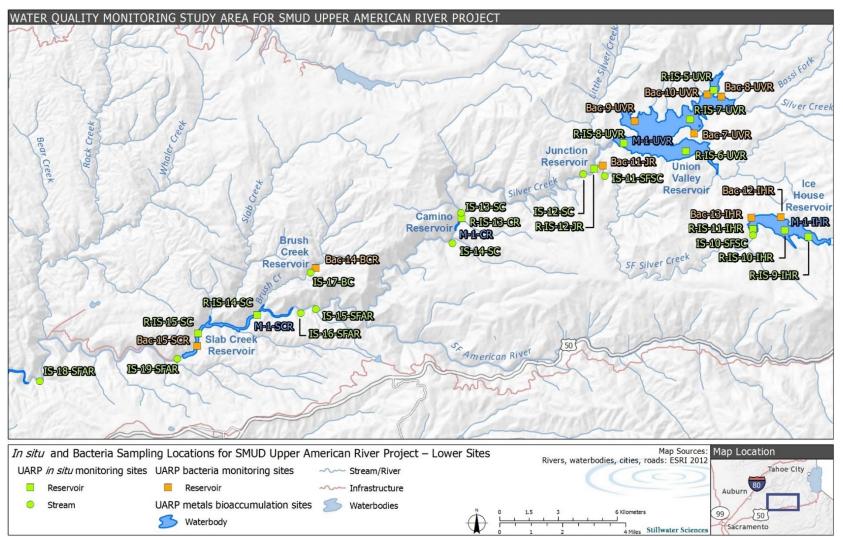


Figure 4-2. In situ water quality, bacteria, and metals bioaccumulation sampling locations for SMUD Upper American River Project – lower sites.



Table 4-2. *In situ* Water Quality Sampling Locations and Dates for SMUD Upper American River Project Reservoir Sites.

SMUD Site Name			2016 Sample
one nume	Site ID	Location	Date ¹
R-4C	R-IS-1-LL	Loon Lake, upper reservoir (northeast body)	10/26
R-4B	R-IS-2-LL	Loon Lake, mid-reservoir (west body)	10/26
R-4A	R-IS-3-LL	Loon Lake, near dam	10/16
R-5	R-IS-4-GC	Gerle Creek Reservoir, mid-lake	5/17
R-6C	R-IS-5-UVR	Union Valley Reservoir, Robbs PH tailrace zone	4/26, 10/25
R-6D	R-IS-6-UVR	Union Valley Reservoir, Jones Fork Silver Creek arm	4/26, 10/25
R-6B	R-IS-7-UVR	Union Valley Reservoir, mid-reservoir	4/26, 10/25
R-6A	R-IS-8-UVR	Union Valley Reservoir, near dam	4/26, 10/25
R-7C	R-IS-9-IHR	Ice House Reservoir, upper lake body	4/25, 10/27
R-7B	R-IS-10-IHR	Ice House Reservoir, mid-reservoir	4/25, 10/27
R-7A	R-IS-11-IHR	Ice House Reservoir, near dam	4/25, 10/27
R-8	R-IS-12-JR	Junction Reservoir, mid-reservoir between arms	4/25, 10/27
R-9	R-IS-13-CR	Camino Reservoir, mid-reservoir	4/28, 10/24
R-11B	R-IS-14-SC	Slab Creek Reservoir, upper-reservoir	4/27, 10/24
R-11A	R-IS-15-SC	Slab Creek Reservoir, mid-reservoir	4/27, 10/24

¹ Loon Lake was under ice cover in April and was not sampled. Gerle Creek Reservoir was not sampled in October because the reservoir was spilling and it was not safe to launch a boat near the dam.

Table 4-3. In situ Water Quality Sampling Locations and Dates for SMUD Upper American River	
Project Riverine Sites.	

SMUD			
Site			2016
Name	Site ID	Location	Sample Dates ¹
2	IS-1-RR	Rubicon River outflow from Rubicon Reservoir	8/23, 11/7
5	IS-2-LRR	Little Rubicon River outflow from Rockbound Lake	8/23, 11/8
6	IS-3-LRR	Little Rubicon outflow from Buck Island Lake	8/23, 11/8
7	IS-4-GC	Gerle Creek outflow from Loon Lake	8/23, 5/17, 11/7
14	IS-5-GC	Gerle Creek inflow to Gerle Creek Reservoir	5/1, 8/23, 11/7
15	IS-6-GC	Gerle Creek outflow from Gerle Creek Reservoir	2/9, 5/1, 8/23
18	IS-7-SFRR	S.F. Rubicon upstream of Gerle Creek confluence	5/1, 8/23, 11/7
19	IS-8-SFRR	S.F. Rubicon downstream of Gerle Creek confluence	5/1, 8/23,11/7
16	IS-9-GCC	Gerle Creek Canal inflow to Robbs Forebay	2/9 5/1, 8/23, 11/7
25	IS-10-SFSC	S.F. Silver Creek outflow from Ice House	2/8, 5/2, 8/25, 11/9
27	IS-11-SFSC	S.F. Silver Creek inflow to Junction Reservoir	2/8, 5/2, 8/26, 11/9
29	IS-12-SC	Silver Creek outflow from Junction Reservoir	2/8, 5/2, 8/26, 11/9
32	IS-13-SC	Silver Creek inflow to Camino Reservoir	2/8, 5/2, 8/26, 11/9
34	IS-14-SC	Silver Creek outflow from Camino Reservoir	2/8, 5/2, 8/26, 11/9
38	IS-15-SFAR	SFAR upstream of Camino Powerhouse	2/8, 5/3, 8/26, 11/10
41	IS-16-SFAR	SFAR downstream of Camino Powerhouse	2/8, 5/3,8/26, 11/10
40	IS-17-BC	Brush Creek outflow from Brush Creek Reservoir	2/8, 5/3, 8/26, 11/10
60	IS-18-SFAR	SFAR upstream of White Rock Powerhouse	2/9, 5/3, 8/24, 11/10
43	IS-19-SFAR	SFAR downstream of Slab Creek Reservoir	2/8, 5/3, 8/24, 11/10

¹ Sites IS-1-RR, IS-2-LRR, IS-3-LRR, IS-4-GC, IS-5-GC, IS-7-SFRR and IS-8-SFRR were inaccessible during the February sampling event due to snow accumulation. Sites IS-1-RR, IS-2-LRR, IS-3-LRR were inaccessible during the May sampling event due to snow accumulation. Site IS-6-GC was unsafe to access during the November event



because it is located immediately downstream of Gerle Creek Reservoir, which was spilling during the sampling event.

Table 4-4. Bacteria Sampling Locations and Dates for SMUD Upper American River Pi	roject
Riverine Sites.	-

Reservoir	SMUD Site Name	Site ID	Location	2016 Sample Dates
Buck Island Reservoir (beach	R-3B	Bac-1-Bl	On Northshore, near dam and Off-Highway Vehicle camping	8/23, 8/30, 9/6, 9/13, 9/20
locations)	77	Bac-2-Bl	On south shore, near Rubicon Hiking Trail	8/23, 8/30, 9/6, 9/13, 9/20
Loon Lake Reservoir	64	Bac-3-LL	West of main dam, near Red Fir Campground	8/23, 8/30, 9/6, 9/13, 9/20
(beach locations)	65	Bac-4-LL	West of Loon Lake Campground, near boat launch	8/23, 8/30, 9/6, 9/13, 9/20
Gerle Creek Reservoir	66	Bac-5-GCR	Near Gerle Creek Campground	6/21, 6/28, 7/6, 7/12, 7/19
(beach locations)	67	Bac-6-GCR	Near Angel Creek picnic area	6/21, 6/28, 7/6, 7/12, 7/19
	R-6H	Bac-7-UVR	At Fashoda Beach	6/21, 6/28, 7/6, 7/12, 7/19
Union Valley Reservoir	R-6E	Bac-8-UVR	Near Wench Creek Campground	6/21, 6/28, 7/6, 7/12, 7/19
(swim areas)	FC-2	Bac-9-UVR	Near Camino Cove Campground	6/21, 6/28, 7/6, 7/12, 7/19
	R-6F	Bac-10-UVR	Near Yellowjacket Campground	6/21, 6/28, 7/6, 7/12, 7/19
Other UARP Locations	R-8B	Bac-11-JR	Junction Reservoir, near boat launch	6/21, 6/28, 7/6, 7/12, 7/19
Ice House Reservoir	68	Bac-12-IHR	Northshore near private campground access	6/20, 6/27, 7/5, 7/11, 7/18
(beach locations)	69	Bac-13-IHR	East of boat launch and picnic area	6/20, 6/27, 7/5, 7/11, 7/18
Other UARP	R-10B	Bac-14-BCR	Brush Creek Reservoir, near boat launch	6/20, 6/27, 7/5, 7/11, 7/18
locations	R-11C	Bac-15-SCR	Slab Creek Reservoir, near boat launch	6/20, 6/27, 7/5, 7/11, 7/18



Table 4-5. Metals Bioaccumulation Sampling Locations and Dates for SMUD Upper American River	
Project Reservoir Sites.	

Reservoir	SMUD Site Name	Site ID	Locations ¹	2016 Sample Dates
Loon Lake Reservoir	80	M-1-LL	Various	8/30
Gerle Creek Reservoir	81	M-1-GCR	Various	8/31
Union Valley Reservoir ²	82	M-1-UVR	Various	8/30, 9/1
Ice House Reservoir	83	M-1-IHR	Various	8/29
Camino Reservoir	84	M-1-CR	Various	8/30
Slab Creek Reservoir	85	M-1-SCR	Various	8/31

¹ Electrofishing and gill-net placement locations are described in Appendix G.
 ² Union Valley Reservoir was divided into two separate locations and sampled on multiple days (see Appendix G).



5.0 METHODS

5.1 IN SITU PARAMETERS

Reservoir *in situ* water quality monitoring was conducted by watercraft to access midreservoir areas (Figure 5-1). A multi-probe Sonde (Yellow Springs Instruments [YSI] 6920) was deployed from the boat for measurement of *in situ* parameters, including water temperature, conductivity, dissolved oxygen, pH, and turbidity (Table 5-1).

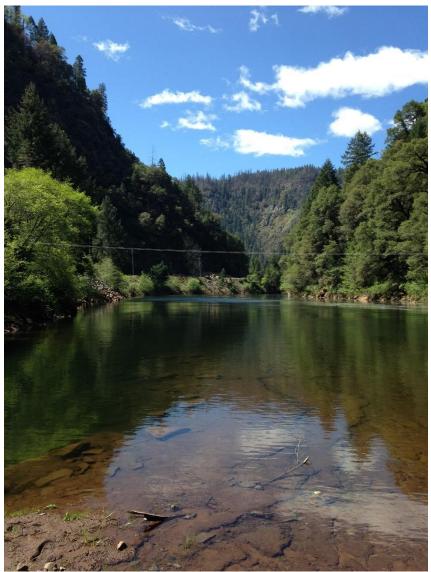


Figure 5-1. Example of mid-reservoir *in situ* water quality sampling site (R-IS-13-CR) at Camino Reservoir.

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At each reservoir site, a vertical water column profile was collected for all *in situ* water quality parameters, at one-meter depth intervals. For bottom water samples, the Sonde was drawn back 0.5 meter (m) from the sediment layer before taking a reading. Prior to taking each reading, the Sonde was allowed to stabilize (typically requiring no more than 90 seconds). Water transparency was measured at reservoir stations with a standard Secchi disk.

At riverine sites, Sonde readings were obtained where sufficient stream turbulence provided good lateral and vertical mixing of the water, and as near as possible to the stream thalweg (Figure 5-2). Prior to taking each reading, the Sonde was allowed to stabilize (typically requiring no more than 90 seconds) such that there was little variability in parameter readings at each location.

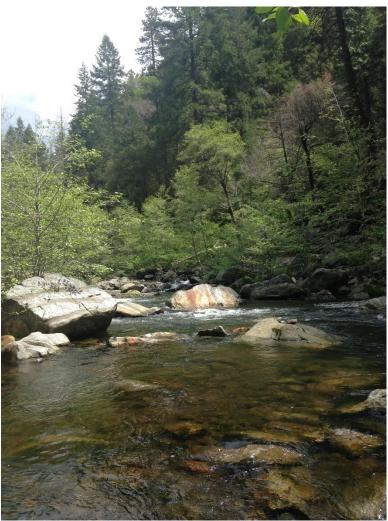


Figure 5-2. Example of an *in situ* water quality sampling site (IS-14-SC) at Silver Creek outflow from Camino Reservoir.



For both reservoir and riverine *in situ* monitoring, Sonde calibration was conducted onsite prior to the start of each sampling day using standard solutions and recorded on calibration logs (Appendix E). Other data gathered at each monitoring station included date, time, site name, sampling location, collector's name, weather conditions, and any other pertinent observations related to the monitoring station. Following each field effort, data was added to a database template provided by SMUD, for eventual transfer into SMUD's master database.

All *in situ* water quality sampling was conducted in compliance with the final, approved Water Quality Monitoring Plan (SMUD 2016a).

Parameter	Method	Units	MDL
Water temperature (YSI 6560 Sensor)	EPA 170.1	degrees Celsius (°C)	0.1
Conductivity (YSI 6560 Sensor)	SM 2510-B microsiemens per centimeter (uS/cm)		1.0
DO (YSI 6562 Rapid Pulse Sensor)	SM 4500-O(G)	milligrams per liter (mg/L)	0.1
pH (YSI 6565 Sensor)	SM 4500-H	standard unit of pH (s.u.)	0.1
Turbidity (YSI 6136 Sensor)	SM 2130B	Nephelometric Turbidity Unit (NTU)	0.1
Secchi depth (Secchi disk)	USGS	meter (m)	0.1

Table 5-1. In situ Water Quality Methods.

DO= dissolved oxygen

EPA= Environmental Protection Agency MDL= method detection limit SM= Standard Methods

5.2 BACTERIA

Bacteria grab samples were collected near reservoir and river shorelines in shallow water, and in particular at swim areas/beach locations (Table 4-4, Figure 5-3). Samples were collected in sterilized bottles supplied by the analytical laboratory. Field sampling personnel filled each sample bottle by direct immersion in the reservoir or stream. Immediately after collection, samples were placed on ice for transport to the analytical laboratory within the required field hold time (Table 5-2).





Figure 5-3. Example of a Bacteria Sampling Site at Buck Island Reservoir (Bac-1-BI).



Analyte	Method	Units	MDL	Hold time
Escherichia coli	SM9223B (Quantitray)	MPN/100 mL	1.8	8 hr
Fecal coliforms	SM9221E (MPN 15 or 25)	MPN/100 mL	1.8	8 hr
or – bour				

Table 5-2. Bacteria Analytical Methods and Field Hold Times.

= hour

MDL = method detection limit

mL = milliliter

MPN = most probable number

SM = Standard Method

Field-based quality assurance and quality control (QA/QC) for bacterial samples was assured by accurate and thoroughly completed sample labels, field sheets, chain of custody, and sample log forms. Sample labels included sample identification code, date, time, preservative, client name, collector's name, reservoir/river name, sampling location, and analysis/sample type. All sample labels were cross-checked by a second field technician before delivering samples to the analytical laboratory.

5.3 METALS BIOACCUMULATION

Fish tissue samples were collected by the California Department of Fish and Wildlife (CDFW) on August 29, 2016 and analyzed at their Marine Pollution Studies Laboratories at Moss Landing, in accordance with protocols of the SWRCB Surface Water Ambient Monitoring Program (SWAMP). Fish collection was conducted by boat using gill netting and electrofishing. Target species included brown trout (Salmo trutta), smallmouth bass (Micropterus dolomieu), rainbow trout (Oncorhynchus mykiss), and Sacramento pikeminnow (*Ptychocheilus grandis*). In some cases, kokanee (*Oncorhynchus nerka*), lake trout (Salvelinus namaycush), and Lahontan cutthroat trout (Oncorhynchus clarkii henshawi) were collected. A minimum of three individuals per species were targeted from each reservoir, non-size specific. As hardhead (Mylopharodon conocephalus) are a state species of special concern and U.S. Forest Service sensitive species, these fish were returned to the reservoir unharmed when they were observed.

Physical characteristics were recorded for each individual fish, including: weight, total length, fork length [FL], and presence of any abnormalities. Each fish was individually tagged, wrapped in aluminum foil, placed in a labeled zipper-closure bag, and stored on dry ice at -20 degrees Celsius (°C) for the duration of the trip. At the analytical laboratory, samples were stored in an ultra-cold freezer at -20 °C until they were processed for analysis.

Fish tissue samples were analyzed in accordance with the General Protocol for Sport Fish Sampling and Analysis (California Environmental Protection Agency 2005) and with methods comparable to those used at the CDFW/MPSL. Tissue samples were processed by removing skin from an area above the lateral line and then extracting a 9-13 gram tissue "plug". Samples were weighed for percent moisture analysis and analyzed using methods shown in Table 5-3.



Table 5-3. Metals, Method Detection and Reporting Limits for Fish Tissue Analyses¹.

Metal	Method	MDL (mg/kg ww)	MRL (mg/kg ww)	MDL (mg/kg dw)	MRL (mg/kg dw)
Copper	EPA 2052 and 220.8 ²	0.06	0.20	0.34	1.00
Lead	EPA 2052 and 220.8 ²	0.002	0.005	0.01	0.03
Mercury	EPA 7473 ³	0.004	0.012	0.015	0.046
Silver	EPA 2052 and 220.8 ²	0.003	0.01	0.02	0.06

EPA= Environmental Protection Agency

MDL= method detection limit

MRL= method reporting limit

ww= wet weight

dw= dry weight

¹ From the Water Quality Monitoring Plan (Revision 2) (SMUD 2016a).

² Digestion and analysis of total copper, total lead, and total silver.

³ Total mercury is a proxy for methylmercury in fish (Weiner *et al.* 2007).

Table 5-4. Target Fish Species, Size Ranges, and Numbers by Location for Metals Bioaccumulation Sampling.

Reservoir (Site Name)	Species Common Name	Fork Length (range, in mm)	Number of Fish Collected
Loon Lake Reservoir	Rainbow Trout	198-373	4
(M-1-LL)	Brown Trout	436-496	3
Gerle Creek Reservoir (M-1-GCR)	Brown Trout	182-312	14
	Smallmouth Bass	170-382	10
	Rainbow Trout	225-360	18
Union Valley Reservoir (M-1-UVR)	Kokanee	209-212	4
	Brown Trout	486	1
	Lake Trout	278-647	5
Ice House Reservoir	Rainbow Trout	264-385	5
(M-1-IHR)	Brown Trout	410-586	3
Camino Reservoir	Lahontan Cutthroat Trout	225-233	3
(M-1-CR)	Brown Trout	245-305	10
	Rainbow Trout	173-249	4
Slab Creek Reservoir (M-1-SCR)	Sacramento Pikeminnow	201-461	7
	Brown Trout	230-505	4



6.0 RESULTS

6.1. IN SITU PARAMETERS

6.1.1. <u>Riverine Sites</u>

In situ water quality data for UARP riverine sites are summarized in Table 6-1.

February Sampling Event

During the February sampling event, water temperatures ranged from 2.1 to 6.7 °C and were variable by site. Riverine dissolved oxygen ranged from 8.5 to 11.6 milligram per liter (mg/L) (82 to 98% saturation), with no measurements falling below Basin Plan instantaneous minimum concentration of 7.0 mg/L for cold freshwater habitat (COLD) and spawning, reproduction, and/or early development (SPWN) designated beneficial uses. pH at riverine sites ranged from 5.1 to 7.1 standard units (s.u.), with three exceedances of the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and no exceedances of the instantaneous maximum pH objective (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum occurred at sites IS-6-GC (5.9 s.u.), IS-9-GCC (6.0 s.u.), and IS-10-SFSC (5.5 s.u.) (Table 6-1).

Typical of granitic watersheds, conductivity at the riverine sites was low, ranging from 8 to 61 microsiemens per centimeter (uS/cm).

Turbidity measurements during the February sampling event ranged from 0.4 to 46.0 Nephelometric Turbidity Unit (NTU) with no particular spatial pattern. Turbidity at the Brush Creek outflow from Brush Creek Reservoir site (IS-17-BC) was 46.0 NTU during this survey (Table 6-1), which was higher than all the other sites and may be due to increased runoff from an area immediately downstream of the King Fire area, which burned over 97,000 acres of land in El Dorado County, California, in mid-September to mid-October 2014.

May Sampling Event

Water temperatures exhibited a greater range and were generally higher than winter temperatures during the May sampling event (5.2 to 11.5°C). Dissolved oxygen ranged from 9.5 to 10.9 mg/L (74 to 102% saturation) across all riverine sites, which is well above the minimum Basin Plan concentration of 7.0 mg/L for COLD and SPWN. pH ranged from 5.0 to 7.6 s.u., with seven exceedances of the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and no exceedances of the instantaneous maximum (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum occurred at sites IS-6-GC (5.6 s.u.), IS-9-GCC (5.0 s.u.), IS-7-SFRR (5.3 s.u.), IS-8-SFRR (5.5 s.u.), IS-10-SFSC (5.3 s.u.), IS-11-SFSC (5.5 s.u.), and IS-12-SC (5.5 s.u.) (Table 6-1.



Conductivity at the riverine sites was low, ranging from 10.0 to 57 uS/cm during May sampling. Turbidity measurements ranged from 0.0 to 20.1 NTU. All turbidity measurements were similar except for the Brush Creek outflow from Brush Creek Reservoir site (IS-17-BC), which exhibited 20.1 NTU (Table 6-1).



Site ID	2016 Sample Date	Water Temperature (°C)	рН (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
	•		Feb	ruary 2016		· · · ·	
IS-1-RR	-	-	-	-	-	-	-
IS-2-LRR	-	-	-	-	-	-	-
IS-3-LRR	-	-	-	-	-	-	-
IS-4-GC	-	-	-	-	-	-	-
IS-5-GC	-	-	-	-	-	-	-
IS-6-GC	2/9	2.1	5.9	11.6	84	15 ^Q	0.7
IS-9-GCC	2/9	2.3	6.0	11.3	83	17 ^Q	0.5
IS-7-SFRR	-	-	-	-	-	-	-
IS-8-SFRR	-	-	-	-	-	-	-
IS-10-SFSC	2/8	3.6	5.5	10.9	82	8 ^Q	6.0
IS-11-SFSC	2/8	4.7	6.7	10.9	82	13 ^Q	1.0
IS-12-SC	2/8	3.2	6.8	10.9	82	10 ^Q	0.6
IS-13-SC	2/8	6.3	6.8	11.1	90	16 ^Q	1.9
IS-14-SC	2/8	6.7	7.0	10.1	88	11 ^Q	0.8
IS-15-SFAR	2/8	6.2	7.0	11.5	93	61 ^Q	1.3
IS-16-SFAR	2/8	4.9	7.1	10.8	84	29 ^Q	1.1
IS-17-BC	2/8	7.1	6.9	10.8	89	28 ^Q	46.0
IS-18-SFAR	2/9	7.7	6.8	11.7	98	22 ^Q	1.2
IS-19-SFAR	2/8	5.0	7.1	11.6	91	17 ^Q	2.1
	•	·	N	lay 2016		•	
IS-1-RR	-	-	-	-	-	-	-
IS-2-LRR	-	-	-	-	-	-	-
IS-3-LRR	-	-	-	-	-	-	-
IS-4-GC	5/17	7.0	7.1	9.8	81	10	1.4
IS-5-GC	5/1	7.0	7.1	9.8	81	10	0.0
IS-6-GC	5/1	6.7	5.6	10.6	86	12	0.2
IS-9-GCC	5/1	8.0	5.0	10.7	90	30	0.3
IS-7-SFRR	5/1	8.6	5.3	10.1	86	11	0.2
IS-8-SFRR	5/1	8.3	5.5	10.4	89	12	0.3
IS-10-SFSC	5/2	5.2	5.3 ^Q	10.6	83	10 ^Q	0.0
IS-11-SFSC	5/2	6.8	5.5 ^Q	10.9	89	12 ^Q	0.3

Table 6-1. In situ Water Quality for UARP Riverine Sites.



Site ID	2016 Sample Date	Water Temperature (°C)	рН (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
IS-12-SC	5/2	5.9	5.5 ^Q	10.9	89	12 ^Q	0.3
IS-13-SC	5/2	8.6	6.9 ^Q	10.0	93	18 ^Q	0.5
IS-14-SC	5/2	7.7	6.9 ^Q	10.0	94	10 ^Q	0.2
IS-15-SFAR	5/3	9.2	7.0	9.9	99	57	2.6
IS-16-SFAR	5/3	7.9	7.3	10.4	102	55	1.2
IS-17-BC	5/3	10.1	7.7	9.5	92	38	20.1
IS-18-SFAR	5/3	11.5	7.3	10.0	101	35	0.6
IS-19-SFAR	5/3	8.9	7.6	9.8	98	21	1.1
			Au	gust 2016			
IS-1-RR	8/23	20.2	6.8	6.7	74	6	0.9
IS-2-LRR	8/23	18.0	6.9	6.3	66	7	1.2
IS-3-LRR	8/23	21.5	6.6	6.9	78	9	1.6
IS-4-GC	8/23	11.5	6.4	8.5	78	6	1.6
IS-5-GC	8/23	18.5	6.8	8.0	85	8	1.6
IS-6-GC	8/23	15.6	6.5	8.2	82	9	1.6
IS-9-GCC	8/23	18.3	6.8	8.4	89	8	1.6
IS-7-SFRR	8/23	18.0	6.7	8.1	85	9	0.1
IS-8-SFRR	8/23	18.2	6.9	8.1	88	11	1.6
IS-10-SFSC	8/25	7.4	6.4	9.9	82	10	1.4
IS-11-SFSC	8/26	12.3	6.9	9.3	87	14	0.4
IS-12-SC	8/26	9.2	6.4	9.6	84	11	0.6
IS-13-SC	8/26	15.1	6.9	9.0	91	11	0.7
IS-14-SC	8/26	11.0	6.7	10.2	93	13	0.6
IS-15-SFAR	8/26	19.0	7.1	9.0	97	34	1.2
IS-16-SFAR	8/26	12.1	6.7	10.5	97	41	0.7
IS-17-BC	8/26	18.8	7.3	8.4	90	24	3.4
IS-18-SFAR	8/24	15.7	6.5	9.5	95	23	0.8
IS-19-SFAR	8/24	12.5	6.1	10.0	94	20	0.2
				ember 2016			
IS-1-RR	11/7	5.2	6.6	9.8	77	6	1.0
IS-2-LRR	11/8	6.0	7.2	10.0	78	1 ^Q	1.2
IS-3-LRR	11/8	6.5	6.7	9.9	81	5 ^Q	1.1
IS-4-GC	11/7	9.0	7.1	9.3	80	10	1.3
IS-5-GC	11/7	6.9	6.9	10.0	82	12	1.3



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

Site ID	2016 Sample Date	Water Temperature (°C)	рН (s.u.)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	Turbidity (NTU)
IS-6-GC	-	-	–	(g, _)	- (// Cut/	–	-
IS-9-GCC	11/7	6.5	6.7	9.9	80	34	1.0
IS-7-SFRR	11/7	5.8	6.1	10.4	83	15	1.1
IS-8-SFRR	11/7	6.8	6.6	10.3	85	13	1.2
IS-10-SFSC	11/9	7.6	5.6	9.3	78	7 ^Q	3.5
IS-11-SFSC	11/9	5.3	6.1	10.6	84	10 ^Q	2.5
IS-12-SC	11/9	8.6	6.0	9.9	85	8 Q	2.7
IS-13-SC	11/9	9.5	6.9	10.4	91	12 ^Q	3.1
IS-14-SC	11/9	10.5	6.9	10.2	91	13 ^Q	3.1
IS-15-SFAR	11/10	9.0	6.0	10.1	87	30 ^Q	1.1
IS-16-SFAR	11/10	10.6	6.2	10.4	94	19 ^Q	1.2
IS-17-BC	11/10	11.6	6.3	10.0	91	22 ^Q	39.6
IS-18-SFAR	11/10	11.1	6.8	10.8	99	31 ^Q	1.9
IS-19-SFAR	11/10	10.3	6.6	10.4	93	18 ^Q	3.7

°C = degrees Celsius

s.u. = standard unit of pH

mg/L = milligrams per liter

% sat = percent saturation

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Unit

"-" indicates that data were not collected due to site inaccessibility.

"Q" Data that are designated as "qualified" because the post-sampling calibration check measurement quality objective (MQO) for acceptability was not met (see Appendix E).



August Sampling Event

During the August sampling event, water temperatures ranged from 7.4 to 21.5°C and were variable by site. Riverine dissolved oxygen during the August sampling event ranged from 6.3 to 10.5 mg/L (66 to 98% saturation), with three measurements falling below the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN. Measured dissolved oxygen below the Basin Plan instantaneous minimum occurred at sites IS-1-RR (6.7 mg/L), IS-2-LRR (6.3 mg/L), and IS-3-LRR (6.9 mg/L) (Table 6-1), which may be due to low river flows or higher water temperatures at these sites in August. Riverine pH ranged from 6.1 to 7.1 with one exceedance of the Basin Plan instantaneous minimum (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum (6.1 s.u.) (Table 6-1).

Conductivity at the riverine sites was low, ranging from 6 to 41 uS/cm. During the August sampling event, turbidity measurements were low, ranging from 0.1 to 3.4 NTU.

November Sampling Event

Water temperatures during the November sampling event ranged from 5.2 to 11.6 °C. Riverine dissolved oxygen ranged from 9.3 to 10.6 mg/L (78 to 99% saturation), with no measurements falling below Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN. Riverine pH ranged from 5.6 to 7.2 during the November event with one exceedance of the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and no exceedances of the instantaneous maximum (8.5 s.u.). Measured pH below the Basin Plan instantaneous minimum occurred at Site IS-10-SFSC (5.6 s.u.) (Table 6-1).

Conductivity at the riverine sites was low, ranging from 1 to 34 uS/cm during November sampling. Turbidity ranged from 1.0 to 39.6 NTU, with the highest turbidity occurring again at the Brush Creek outflow from Brush Creek Reservoir site (IS-17-BC) (Table 6-1). Overall, the increase in November riverine turbidity levels would not be expected to cause a nuisance or adversely affect beneficial uses.

6.1.2. Reservoir Sites

In situ water quality data for UARP reservoir sites are presented in Figures 6-1 through 6-13 and Appendix A.

April Sampling Event

During the April sampling event, the onset of seasonal thermal stratification was apparent in Union Valley, Ice House, and Junction reservoirs, with thermocline development between roughly 4 and 17 meters (m) deep, depending on the site (Figure 6-1 to Figure 6-5). Surface water temperatures at these sites ranged from 7.8° to 10.9°C and bottom water temperatures were lower, ranging from 4.9° to 5.9°C. Dissolved oxygen, pH, and



turbidity were generally consistent with depth, suggesting well-mixed water columns that had only recently begun to stratify due to increasing surface water temperatures. Dissolved oxygen concentrations were above 10 mg/L at all sites in these three reservoirs, well above the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN designated beneficial uses. pH was generally at or below the Basin Plan instantaneous minimum pH objective (6.5 s.u.) at all sites, with the exception of two sites in Ice House Reservoir (sites R-IS-10-IHR and R-IS-11-IHR) (Figure 6-4). The lowest pH values of approximately 5.5 s.u. were measured in Junction Reservoir (Site R-IS-12-JR) (Figure 6-5). There were no instances of pH measurements greater than the instantaneous maximum pH objective (8.5 s.u.). Turbidity levels were very low (\leq 1 NTU) in Union Valley, Ice House, and Junction reservoir sites, with the exception of bottom waters at Site R-IS-9-IHR, where turbidity ranged from <1 to 3 NTU (Figure 6-3). The minor increase in turbidity at Site R-IS-9-IHR may have been due to sampling disturbances of bottom sediments by the water quality probe.

Gerle Creek Reservoir, Camino Reservoir, and the relatively shallow site in Slab Creek Reservoir (Site R-IS-14-SCR) exhibited little variation in water temperature with depth, indicating that stratification was not underway at these locations (Figure 6-1, Figure 6-5, and Figure 6-6). As these three waterbodies are regulating reservoirs, their hydraulic residence times tend to be relatively low and they are not as likely to experience thermal stratification as the storage reservoirs (e.g., Union Valley, Ice House). Dissolved oxygen concentrations were above 10 mg/L at all reservoir sites in April, well above the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN designated beneficial uses. pH was generally at or below the Basin Plan instantaneous minimum pH objective (6.5 s.u.) at all three reservoir sites. There were no instances of pH measurements greater than the instantaneous maximum pH objective (8.5 s.u.). Turbidity levels were very low (\leq 1 NTU) at all reservoir sites, with the exception of waters near the bottom of Gerle Creek Reservoir where turbidity increased to approximately 3 NTU (Figure 6-1). The minor increases in turbidity at this location may have been due to sampling disturbances of bottom sediments by the water quality probe.



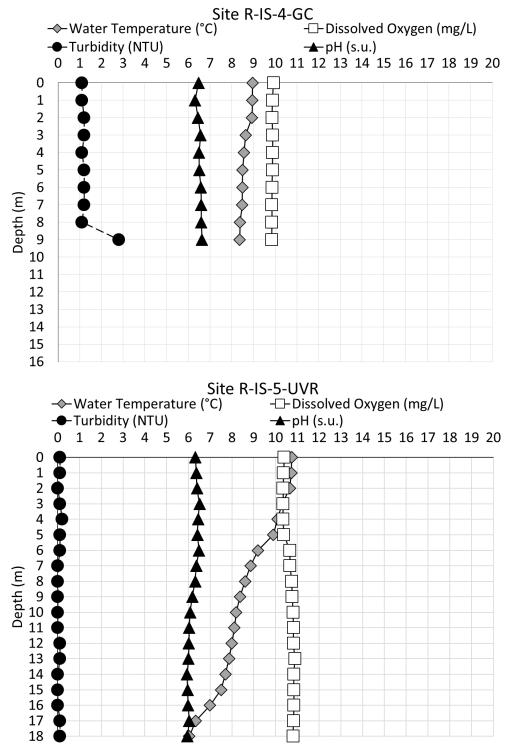


Figure 6-1. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Gerle Creek Reservoir and Union Valley Reservoir sites R-IS-4-GC (top) and R-IS-5-UVR (bottom) during April/May 2016.



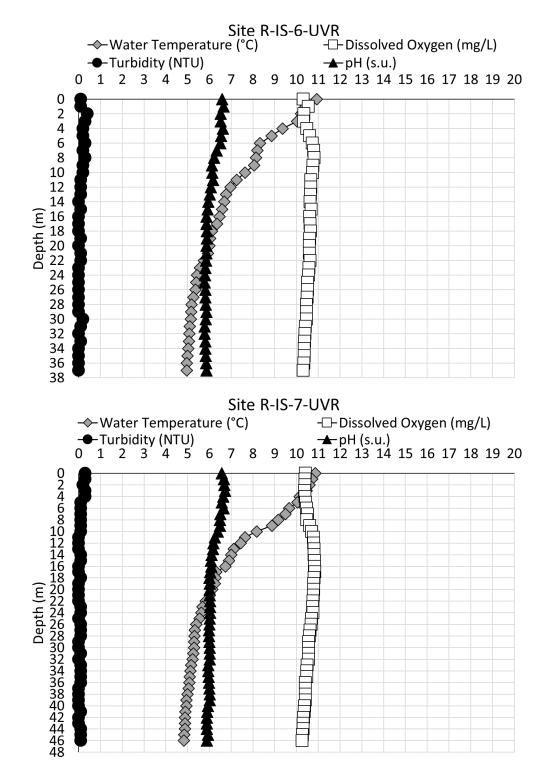


Figure 6-2. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-6-UVR (top) and R-IS-7-UVR (bottom) during April 2016.



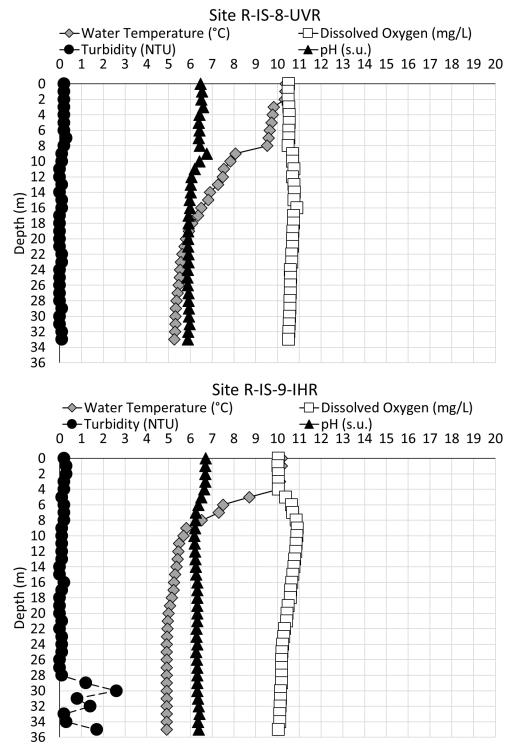


Figure 6-3. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir and Ice House Reservoir sites R-IS-8-UVR (top) and R-IS-9-IHR (bottom) during April 2016.



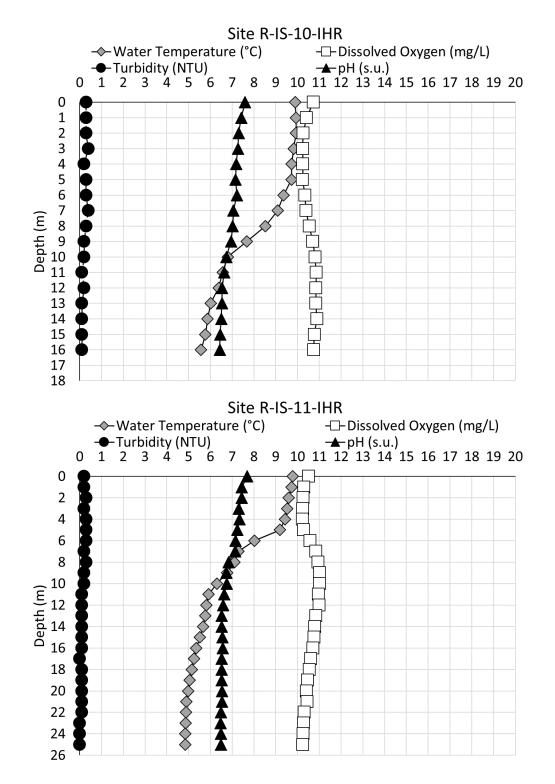


Figure 6-4. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir sites R-IS-10-IHR (top) and R-IS-11-IHR (bottom) during April 2016.



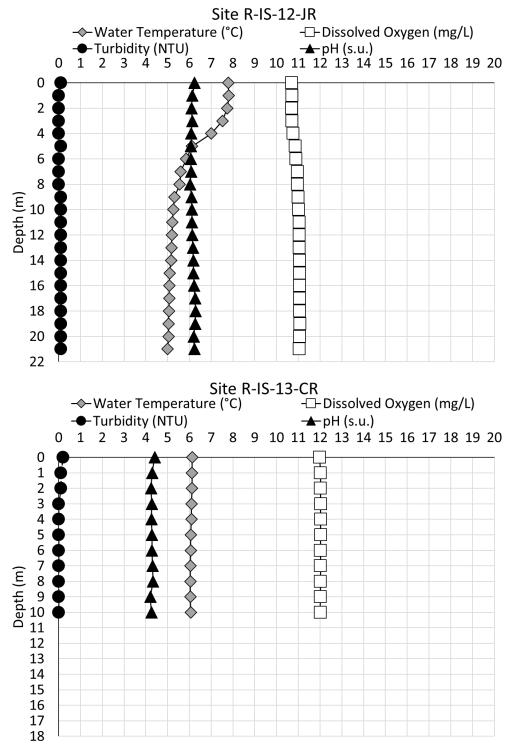


Figure 6-5. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Junction Reservoir and Camino Reservoir sites R-IS-12-JR (top) and R-IS-13-CR (bottom) during April 2016.



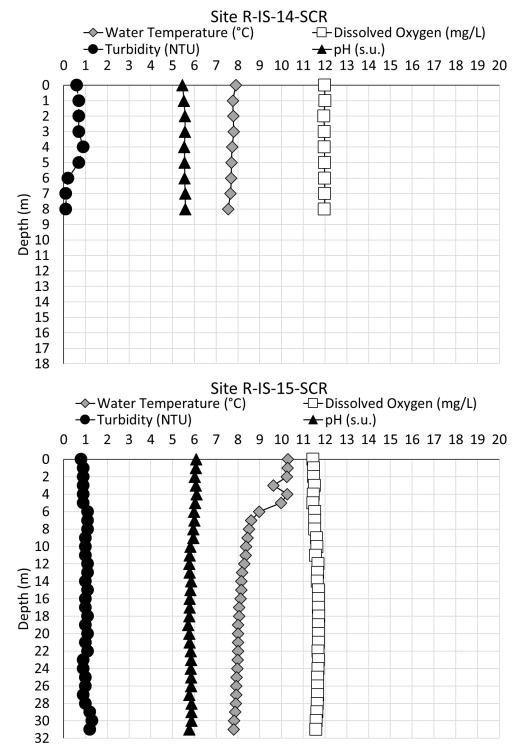


Figure 6-6. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Slab Creek Reservoir Sites R-IS-14-SCR and R-IS-15-SCR during April 2016.



October Sampling Event

During the October sampling event, surface water temperatures at all reservoir sites ranged from 10 to 15 °C and bottom water temperatures ranged from 9.7° to 13.8°C. Loon Lake, Camino Reservoir, and Slab Creek Reservoir exhibited little to no variation in water temperature with depth (Figure 6-7, Figure 6-8, Figure 6-12, Figure 6-13), indicating that these three waterbodies had already mixed for the fall, or in the case of Camino and Slab Creek reservoirs, may not have stratified during 2016 (see April Sampling Event results above). Dissolved oxygen and pH in these reservoirs were generally consistent with depth, suggesting a well-mixed water column at each profile location. Dissolved oxygen concentrations were well above the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN designated beneficial uses. pH measurements at Site R-IS-1-LL were low and generally below the Basin Plan instantaneous minimum pH objective of 6.5 s.u. (Figure 6-7) There were no instances of pH measurements greater than the instantaneous maximum pH objective (8.5 s.u.) in Loon Lake, Camino Reservoir, and Slab Creek Reservoir. Turbidity levels were low (< 4 NTU), with the exception of waters between approximately 8 and 13 m at Slab Creek Reservoir Site R-IS-15-SC, where turbidity increased slightly to 12.2 NTU (Figure 6-13).

Union Valley Reservoir exhibited a deep thermocline at 21-23 m (except for the shallow site R-IS-5-UVR) (Figures 6-8 through 6-10), which may have been descending as surface waters cooled and the water column began to mix. Junction Reservoir exhibited a similar pattern, with a slight thermocline at roughly 18 m, or very close to the bottom of this waterbody (Figure 6-12). Dissolved oxygen and pH in these reservoirs were generally similar with depth, with slight variations between surface waters and deeper waters. At Site R-IS-8-UVR, dissolved oxygen decreased by 1 mg/L (from 8 mg/L to 7 mg/L) at the approximate location of the thermocline (23 m) and continued decreasing to approximately 6 mg/L in bottom waters (Figure 6-10). Dissolved oxygen concentrations at other Union Valley and Junction reservoir sites were well above Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN designated beneficial uses. With the exception of sites R-IS-6-UVR (Figure 6-9) and R-IS-8-UVR (Figure 6-10), pH was generally above the Basin Plan instantaneous minimum pH objective (6.5 s.u.). There were no instances of pH measurements greater than the instantaneous maximum pH objective (8.5 s.u.) in Union Valley Reservoir. Turbidity levels were low (< 4 NTU) at all sites in Union Valley and Junction reservoir.

Ice House Reservoir showed the greatest degree of stratification during the October survey, with a thermocline between approximately 14 and 24 m at sites R-IS-9-IHR and R-IS-11-IHR (Figure 6-10 and Figure 6-11). Dissolved oxygen concentrations in the bottom waters at Site R-IS-11-IHR decreased to 1.3 mg/L near the sediment-water interface (Figure 6-11), a result that is not uncommon for deep waterbodies that have been thermally stratified for several months. Dissolved oxygen in surface waters at all sites in Ice House Reservoir was well above the Basin Plan instantaneous minimum concentration of 7.0 mg/L for COLD and SPWN designated beneficial uses. pH was generally above the Basin Plan instantaneous minimum pH objective (6.5 s.u.) and there



were no instances of pH measurements greater than the instantaneous maximum pH objective (8.5 s.u.) in Ice House Reservoir. Turbidity levels were low (< 4 NTU) at all sites in Ice House Reservoir.



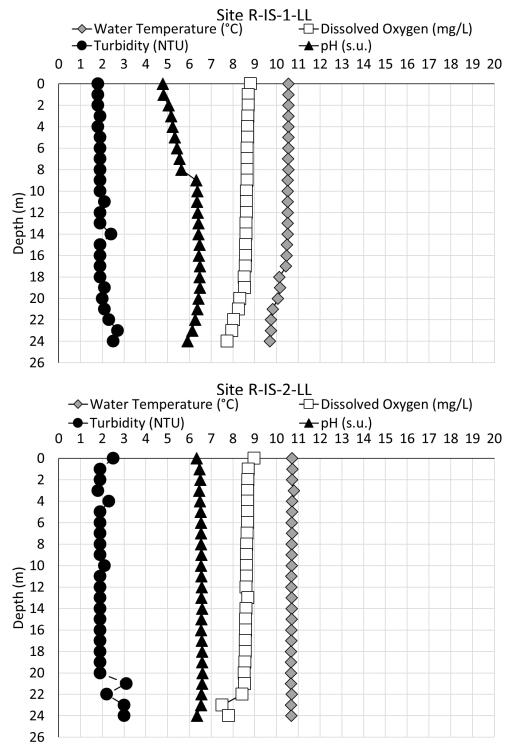


Figure 6-7. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake sites R-IS-1-LL (top) and R-IS-2-LL (bottom) during October 2016.



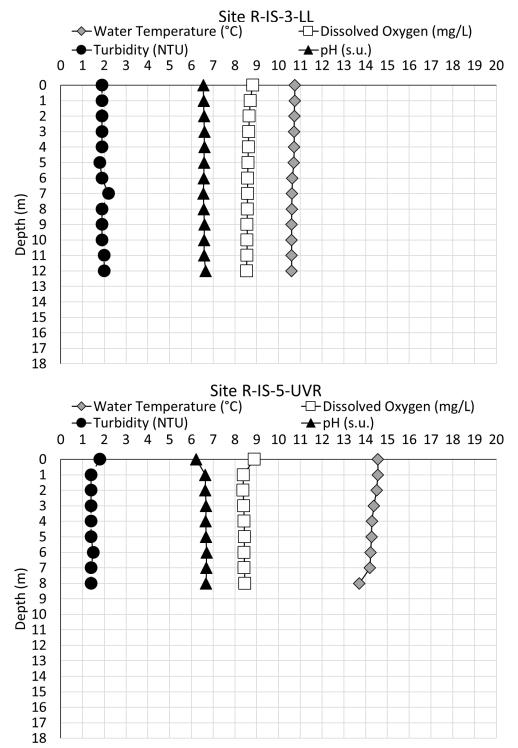


Figure 6-8. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Loon Lake and Union Valley Reservoir sites R-IS-3-LL (top) and R-IS-5-UVR (bottom) during October 2016.



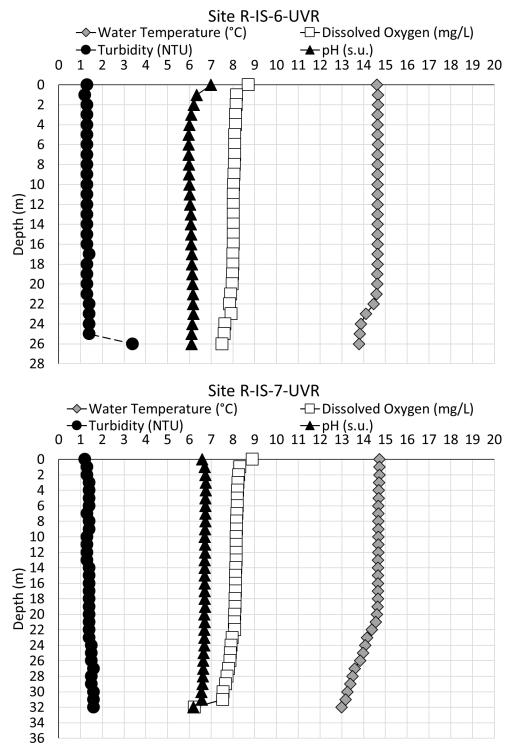


Figure 6-9. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir sites R-IS-6-UVR (top) and R-IS-7-UVR (bottom) during October 2016.



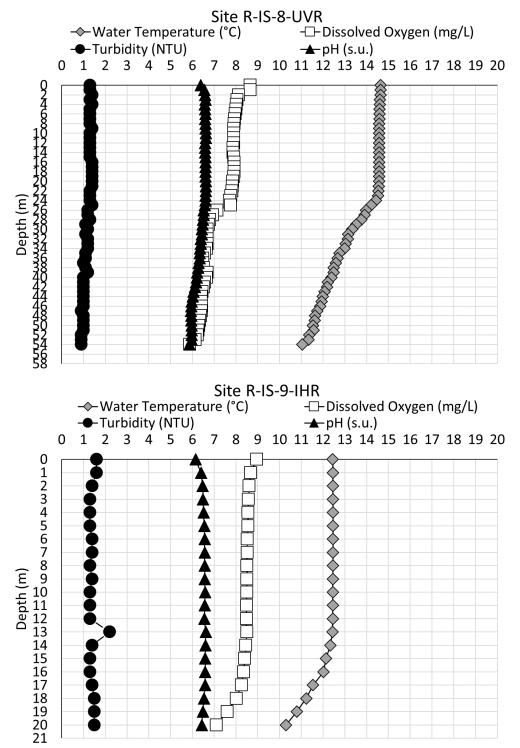


Figure 6-10. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Union Valley Reservoir and Ice House Reservoir sites R-IS-8-UVR (top) and R-IS-9-IHR (bottom) during October 2016.



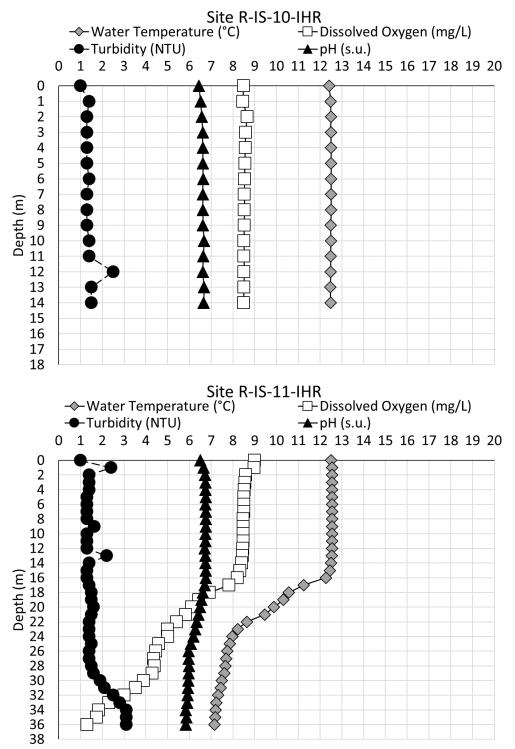


Figure 6-11. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Ice House Reservoir sites R-IS-10-IHR (top) and R-IS-11-IHR (bottom) during October 2016.



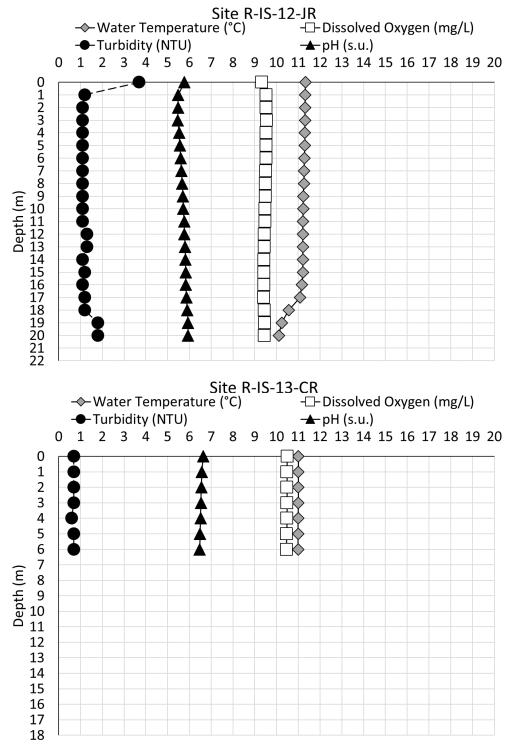


Figure 6-12. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Junction Reservoir site R-IS-12-JR (top) and Camino Reservoir site R-IS-13-CR (bottom) during October 2016.



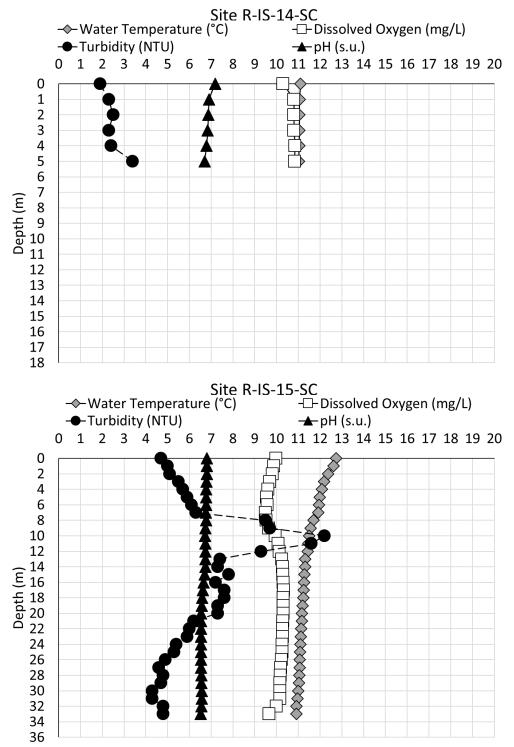


Figure 6-13. *In situ* water temperature, dissolved oxygen, turbidity, and pH at Slab Creek Reservoir sites R-IS-14-SC (top) and R-IS-15-SC (bottom) during October 2016.



6.2. BACTERIA

Instantaneous fecal coliform counts ranged from less than the method detection limit (MDL) (1.8 most probable number per 100 milliliters [MPN/100 mL]) to 94 MPN/100 mL during both the 2016 Independence Day and Labor Day sampling events (Appendix B, Table B-1). Overall, the geometric mean fecal coliform counts for the 2016 sampling events ranged from 0.9 to 6.4 MPN/100 mL (Table 6-2), where results less than the MDL were treated as 0.5 x MDL for the calculation. The lowest geometric mean fecal coliform counts (0.9 MPN/100 mL) occurred in Union Valley Reservoir (Bac-8-UVR) during the Independence Day sampling event and in Buck Island Reservoir (Bac-1-BI, Bac-2-BI) and Loon Lake (Site Bac-3-LL) during the Labor Day sampling event (Table 6-2). The highest geometric mean fecal coliform count (6.4 MPN/100 mL) occurred in Junction Reservoir (Site Bac-11-JR) during the Independence Day sampling event. The highest count was well below the Basin Plan objective of 200 MPN/100 mL, as a geometric mean of five samples collected over 30 days, for the recreational water contact (REC-1) designated beneficial use. Further, none of the 2016 samples exceeded the instantaneous maximum Basin Plan objective of 400 MPN/100 mL.

Instantaneous *Escherichia coli* counts ranged from less than the MDL (1 MPN/100 mL) to 36 MPN/100 mL during the 2016 Independence Day and Labor Day sampling events (Appendix B, Table B-1). Overall, the geometric mean *E. coli* counts for the 2016 events ranged from 0.5 to 10.6 MPN/100 mL (Table 6-2), where results less than the MDL were treated as 0.5 x MDL for the calculation. The three lowest geometric mean *E. coli* counts (0.5 MPN/100 mL) occurred in Buck Island Reservoir (Site Bac-2-BI) and Loon Lake (sites Bac-3-LL and Bac-4-LL) during the Labor Day sampling event, while the highest geometric mean *E. coli* count (10.6 MPN/100 mL) occurred in Junction Reservoir (Site Bac-11-JR) during the Independence Day sampling event. There is no Basin Plan numeric objective for *E. coli*.

Site ID	Fecal coliform geometric mean ^{1,2} (MPN/100 mL)	<i>E. coli</i> geometric mean (MPN/100 mL)
	Independence Day	
Bac-5-GCR	4.7	3.2
Bac-6-GCR	3.5	3.5
Bac-7-UVR	1.8	0.9
Bac-8-UVR	0.9	0.9
Bac-9-UVR	1.7	0.9
Bac-10-UVR	2.0	0.9
Bac-11-JR	6.4	10.6
Bac-12-IHR	1.5	0.8
Bac-13-IHR	1.7	1.0
Bac-14-BCR	5.6	1.3

Table 6-2. Bacteria Counts for UARP Reservoir Sites.



Site ID	Fecal coliform geometric mean ^{1,2} (MPN/100 mL)	<i>E. coli</i> geometric mean (MPN/100 mL)
Bac-15-SCR	5.0	1.9
	Labor Day	
Bac-1-BI	0.9	0.6
Bac-2-Bl	0.9	0.5
Bac-3-LL	0.9	0.5
Bac-4-LL	1.1	0.5

MPN/100 mL = most probable number per 100 milliliters

¹ Method detection limit (MDL for fecal coliform = 1.8 MPN/100 mL. MDL for *E. coli* = 1.0 MPN/100 mL. Individual results less than the MDL were treated as 0.5 x MDL for the geometric mean calculations. ² The Basin Plan REC-1 water quality objective is 200 MPN/100 mL expressed as the geometric mean of five samples collected over 30 days.

6.3. METALS BIOACCUMULATION

Metals bioaccumulation data for UARP reservoirs are presented in Table 6-3, Figures 6-14 and 6-15, and Appendix C.

6.3.1. Loon Lake Reservoir

Two fish species (i.e., rainbow trout and brown trout) were collected from Loon Lake Reservoir. Fish tissue samples exhibited total mercury concentrations ranging from 0.02–0.32 micrograms per gram wet weight (ug/g wet weight) on average, with the highest average concentration in brown trout, the largest fish sampled (Table 6-3). Just over 40% of samples, including all three brown trout, collected in Loon Lake Reservoir exhibited total mercury concentrations greater than the Office of Environmental Health Hazard Assessment's (OEHHA's) most protective Advisory Tissue Level (ATL) of 0.07 ug/g methylmercury wet weight¹ (Figure 6-14, Table 6-4), where total mercury is a surrogate for methylmercury in fish tissue (Weiner et al. 2007). OEHHA's ATLs are California's current screening values for determining the potential impairment of a body of water due to the presence of pollutants in fish tissue (Davis et al. 2009). ATLs are not size-specific. No 2016 fish tissue samples were greater than the next most protective ATL of 0.44 ug/g wet weight¹.

¹ OEHHA's two most protective methylmercury ATLs include (Klasing and Brodberg 2008):

 ^{0.070} ug/g wet weight – OEHHA would begin to consider advising children and women of child-bearing age to limit consumption to fewer than eight meals per month;

^{• 0.44} ug/g wet weight – OEHHA may recommend no consumption by children and women of child-bearing age.



Copper concentrations ranged from 0.16–0.18 ug/g wet weight on average, with the highest average concentration in brown trout, the largest fish sampled. Lead and silver concentrations were near or below MDLs for all fish sampled (Table 6-3, Figure 6-15). There are no existing advisory levels for copper, lead, or silver.

6.3.2. Gerle Creek Reservoir

One fish species (i.e., brown trout) was collected from Gerle Creek Reservoir. Fish tissue samples exhibited a total mercury concentration of 0.07 ug/g wet weight on average (Table 6-3). Four of fourteen brown trout (24% of samples), exhibited total mercury concentrations greater than OEHHA's most protective ATL of 0.07 ug/g methylmercury wet weight¹. No samples were greater than the next most protective ATL of 0.44 ug/g wet weight¹ (Figure 6-14, Table 6-4).

The average copper concentration for brown trout collected in Gerle Creek Reservoir was 0.2 ug/g wet weight. With the exception of lead concentrations in three fish, lead and silver concentrations were below MDLs for all fish sampled (Table 6-3, Figure 6-15). There are no existing advisory levels for copper, lead, or silver.

6.3.3. Union Valley Reservoir

Five fish species (i.e., rainbow trout, brown trout, smallmouth bass, kokanee, and lake trout) were collected from Union Valley Reservoir. Fish tissue samples exhibited total mercury concentrations ranging from 0.11–0.22 ug/g wet weight on average, with the highest average concentration in smallmouth bass (Table 6-3). Just over 40% of samples, including all ten smallmouth bass samples, two of four kokanee samples, four of five lake trout samples, and the only brown trout sample, exhibited total mercury concentrations greater than OEHHA's most protective ATL of 0.07 ug/g methylmercury wet weight¹ (Figure 6-14, Table 6-4). One smallmouth bass sample was greater than the next most protective ATL of 0.44 ug/g wet weight¹, exhibiting a tissue concentration of 0.71 ug/g wet weight.

Copper concentrations ranged from 0.16–0.26 ug/g wet weight on average. With the exception of lead concentrations in five fish, lead and silver concentrations were below MDLs for all fish sampled (Table 6-3, Figure 6-15). There are no existing advisory levels for copper, lead, or silver.

6.3.4. Ice House Reservoir

Two fish species (i.e., rainbow trout and brown trout) were collected from Ice House Reservoir. Fish tissue samples exhibited total mercury concentrations ranging from 0.03–0.41 ug/g wet weight on average, with the highest average concentration in brown trout, the largest fish sampled (Table 6-3). Just over 30% of samples, including all three brown trout samples, exhibited total mercury concentrations greater than OEHHA's most protective ATL of 0.07 ug/g methylmercury wet weight¹ (Figure 6-14, Table 6-4). One



brown trout sample was also greater than the ATL of 0.44 ug/g wet weight¹, exhibiting a tissue concentration of 0.59 ug/g wet weight.

Copper concentrations ranged from 0.22–0.20 ug/g wet weight on average. With the exception of lead concentration in one brown trout, lead and silver concentrations were below MDLs for all fish sampled (Table 6-3, Figure 6-15). There are no existing advisory levels for copper, lead, or silver.

6.3.5. Camino Reservoir

Two fish species (i.e., brown trout and Lahontan cutthroat trout) were collected from Camino Reservoir. Fish tissue samples exhibited total mercury concentrations ranging from 0.04–0.05 ug/g wet weight on average (Table 6-3). One of ten brown trout samples (7% of total samples) exhibited total mercury concentrations greater than OEHHA's most protective ATL of 0.07 ug/g methylmercury wet weight¹ (Figure 6-15, Table 6-4). No samples were greater than the next most protective ATL of 0.44 ug/g wet weight¹.

Copper concentrations ranged from 0.17–0.22 ug/g wet weight on average. With the exception of lead concentration in one brown trout, lead and silver concentrations were below MDLs for all fish sampled (Table 6-3, Figure 6-17). There are no existing advisory levels for copper, lead, or silver.

6.3.6. Slab Creek Reservoir

Three fish species (i.e., rainbow trout, brown trout, and Sacramento pikeminnow) were collected from Slab Creek Reservoir. Fish tissue samples exhibited total mercury concentrations ranging from 0.03–0.25 ug/g wet weight on average (Table 6-3). By species, mercury concentrations ranged from 0.025–0.036 ug/g wet weight in rainbow trout (173–249 mm FL), 0.125–0.516 ug/g wet weight in Sacramento pikeminnow (201–461 mm FL), and 0.046–0.406 ug/g wet weight in brown trout (230–505 mm FL). Sixty-five percent of fish samples, including all of seven Sacramento pikeminnow and three of four brown trout samples, exhibited total mercury concentrations greater than OEHHA's most protective ATL of 0.07 ug/g methylmercury wet weight¹ (Figure 6-15, Table 6-4). One Sacramento pikeminnow sample was also greater than the next most protective ATL of 0.44 ug/g wet weight¹, exhibiting a tissue concentration of 0.52 ug/g wet weight.

Copper concentrations ranged from 0.16–0.24 ug/g wet weight on average. With the exception of lead concentration in one rainbow trout, fish samples exhibited lead and silver concentrations below MDLs (Table 6-3, Figure 6-17). There are no existing advisory levels for copper, lead, or silver.



Location	Species Common	2016 Samp-	Number of Fish	Mercury (Hg) (ug/g ww)		Copper (Cu) (ug/g ww)				.ead (Pb) ug/g ww)		Silver (Ag) (ug/g ww)			
	Name	ling Date	Sampled	Rai	nge	Avg ¹	Rar	nge	Avg ¹	Rar	nge	Avg ¹	Rai	nge	Avg ¹
Loon Lake Reservoir	rainbow trout	8/30	4	0.012	0.018	0.015	0.140	0.190	0.155	< 0.002	0.015	0.012	< 0.003	< 0.003	0.002
(M-1-LL)	brown trout	6/30	3	0.206	0.416	0.322	0.150	0.220	0.180	< 0.002	0.003	0.004	< 0.003	< 0.003	0.002
Gerle Creek Reservoir (M-1-GCR)	brown trout	8/31	14	0.029	0.171	0.067	0.130	0.320	0.209	< 0.002	0.011	0.031	< 0.003	< 0.003	0.002
	smallmouth bass		10	0.076	0.713	0.219	0.120	0.200	0.156	< 0.002	0.004	0.003	< 0.003	< 0.003	0.002
Union Valley	rainbow trout	8/30,	18	0.011	0.049	0.017	0.140	0.250	0.182	< 0.002	0.018	0.008	< 0.003	< 0.003	0.002
Reservoir (M-1-UVR)	kokanee	8/31, 9/1	4	0.068	0.247	0.116	0.230	0.280	0.260	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002
(IVI-1-0 V K)	brown trout		1	0.145	0.145	0.145	0.260	0.260	0.260	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002
	lake trout		5	0.053	0.202	0.110	0.200	0.320	0.244	< 0.002	0.017	0.023	< 0.003	< 0.003	0.002
Ice House	rainbow trout	0/00	5	0.013	0.042	0.030	0.200	0.240	0.216	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002
Reservoir (M-1-IHR)	brown trout	8/28	3	0.255	0.585	0.409	0.180	0.240	0.203	< 0.002	0.015	0.021	< 0.003	< 0.003	0.002
Camino Reservoir	Lahontan cutthroat trout	8/30	3	0.029	0.045	0.039	0.160	0.190	0.173	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002
(M-1-CR)	brown trout		10	0.034	0.092	0.047	0.150	0.270	0.216	< 0.002	0.017	0.008	< 0.003	< 0.003	0.002
Slab Creek	rainbow trout		4	0.025	0.036	0.032	0.200	0.300	0.240	< 0.002	0.005	0.006	< 0.003	< 0.003	0.002
Reservoir (M-1-SCR)	Sacramento pikeminnow	8/31	7	0.125	0.516	0.251	0.110	0.260	0.160	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002
	brown trout		4	0.046	0.406	0.211	0.200	0.210	0.205	< 0.002	< 0.002	0.001	< 0.003	< 0.003	0.002

Table 6-3. Fish Tissue Metals Concentrations in UARP Reservoirs.

ug/g = microgram per gram

ww = wet weight

dw = dry weight

¹ Results <MDL were treated as $0.5 \times MDL$ for the calculation of averages.



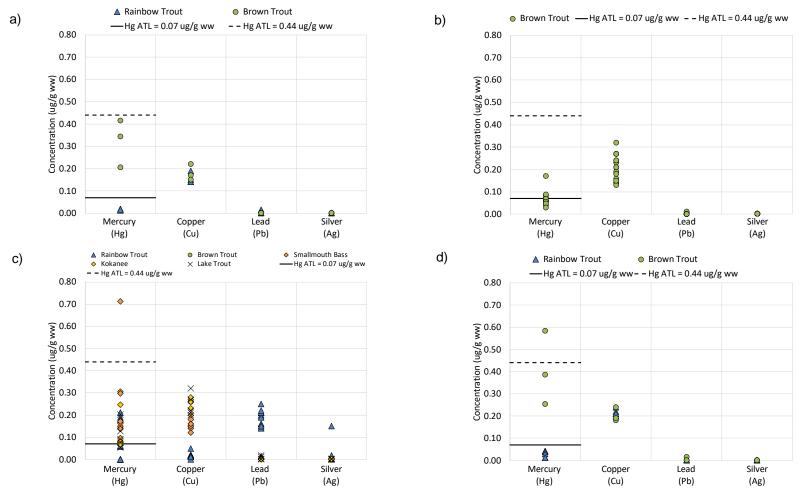


Figure 6-14. Fish tissue metals concentrations in a) Loon Lake Reservoir, b) Gerle Creek Reservoir, c) Union Valley Reservoir and d) Ice House Reservoir during August and September 2016.



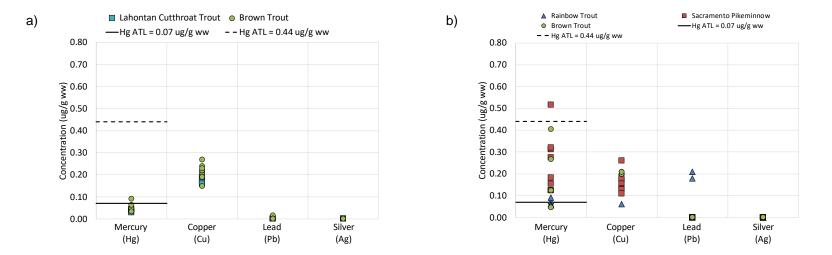


Figure 6-15. Fish tissue metals concentrations in a) Camino Reservoir and b) Slab Creek Reservoir during August and September 2016.



able 0-4. Percentage of Fish fissue Samples Greater finan OERRA Methylmercury ATES.								
Location	Samples greater than 0.07 ug/g ATL ¹	Samples greater than 0.44 ug/g ATL ¹						
Loon Lake Reservoir (M-1-LL)	43%	0%						
Gerle Creek Reservoir (M-1-GCR)	24%	0%						
Union Valley Reservoir (M-1-UVR)	44%	3%						
Ice House Reservoir (M-1-IHR)	33%	11%						
Camino Reservoir (M-1-CR)	7%	0%						
Slab Creek Reservoir (M-1-SCR)	65%	6%						

Table 6-4. Percentage of Fish Tissue Samples Greater Than OEHHA M	lethylmercury ATLs.
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¹ ATL = Advisory Tissue Level, Office of Environmental Health Hazard Assessment (OEHHA) (Klasing and Brodberg 2008)

7.0 CONCLUSIONS

Based on 2016 in situ and bacteria monitoring results, riverine water quality in the UARP study area consistently met Basin Plan water quality objectives for dissolved oxygen and turbidity. There were several instances of pH measured below the Basin Plan instantaneous minimum objective (6.5 s.u.), which may be due to low buffering capacity characteristic of headwater reaches in granitic watersheds. There were no instances of pH measured above the Basin Plan instantaneous maximum objective (8.5 s.u.). Reservoir water quality was also generally good, with occasional values measured below the Basin Plan instantaneous minimum objectives for dissolved oxygen (5 mg/L) in the bottom waters of stratified reservoirs (*i.e.*, Union Valley Reservoir, Ice House Reservoir), a result that is not uncommon for deep waterbodies that have been thermally stratified for several months. As with riverine sites, there were also several instances of pH measured below the Basin Plan instantaneous minimum objective (6.5 s.u.) in surface and bottom waters. There were no instances of pH measured above the Basin Plan instantaneous maximum objective (8.5 s.u.) in reservoir waters and no instances of elevated turbidity. Despite occasional low dissolved oxygen and pH measurements, 2016 monitoring results indicate that overall, surface waters of the UARP study area support designated beneficial uses, including COLD, SPWN, and REC-1.

With the exception of Camino Reservoir, metals bioaccumulation sampling indicated that fish tissue mercury concentrations were greater than the most protective OEHHA ATL (0.07 ug/g wet weight) for 24–65% of samples, particularly for larger fish (FL>300 mm). A small number (n=3) of fish exhibited mercury concentrations greater than the next most protective ATL of 0.44 ug/g wet weight in Union Valley, Ice House, and Slab Creek reservoirs. One TL3 fish and 13 TL4 fish exceeded the SWRCB's proposed WQO (0.2 ug/g) in Loon Lake, Union Valley, Ice House, and Slab Creek reservoirs.

Copper concentrations varied depending on location and species, but all were less than 0.35 ug/g wet weight. Lead and silver concentrations were generally near or below the



method detection limits (<0.002 ug/g wet weight and <0.003 ug/g wet weight, respectively). There are no existing advisory levels for copper, lead, or silver.



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APPENDIX A In situ Vertical Profile Data for UARP Reservoir Sites



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Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
				Gerle Creek	Reservoir				
		surface	9.0	9.9	86	6	6.5	1.1	
		1	9.0	9.9	85	6	6.3	1.1	
		2	8.9	9.9	85	9	6.4	1.2	
		3	8.6	9.9	85	6	6.6	1.2	
R-IS-4-GC	5/17	4	8.6	9.9	85	6	6.5	1.1	5.8
R-13-4-GC	5/17	5	8.5	9.9	84	6	6.5	1.2	5.0
		6	8.5	9.9	84	6	6.6	1.2	
		7	8.5	9.9	84	6	6.6	1.2	
		8	8.4	9.9	84	6	6.6	1.1	
		9	8.4	9.8	84	7	6.6	2.8	
				Union Valle	y Reservoir				
		surface	10.7	10.4	94	11	6.3	0.1	_
		1	70.7	10.4	94	11	6.4	0.1	
		2	10.7	10.4	93	11	6.4	0.0	
		3	10.3	10.4	92	10	6.5	0.1	
		4	10.1	10.3	92	10	6.5	0.2	
		5	9.9	10.4	92	10	6.4	0.1	
R-IS-5- UVR	4/26	6	9.2	10.7	93	10	6.5	0.1	4.9
UVK		7	8.9	10.7	92	10	6.4	0.0	
		8	8.6	10.7	92	10	6.3	0.0	
		9	8.4	10.8	92	10	6.2	0.0	
		10	8.2	10.8	92	10	6.1	0.0	
		11	8.1	10.8	92	10	6.0	0.0	
		12	8.0	10.8	91	9	6.0	0.1	

Table A-1. In situ Vertical Profile Data for UARP Reservoir Sites (Spring).



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		13	7.9	10.9	92	9	6.0	0.1	
		14	7.7	10.8	91	9	5.9	0.0	
		15	7.5	10.8	90	9	6.0	0.0	
		16	7.0	10.9	89	9	6.0	0.0	
		17	6.3	10.8	88	9	6.0	0.1	
		18	6.0	10.8	87	9	6.0	0.1	
		19	5.9	10.8	86	9	5.9	0.1	
		20	5.9	10.8	86	9	5.9	0.1	
		21	5.9	10.6	85	9	5.9	0.1	
		surface	6.58	10.93	10.32	93.4	0.011	0.1	
		1.0	6.65	10.42	10.54	94.2	0.011	0.1	
		2.0	6.52	10.21	10.34	91.9	0.011	0.4	
		3.0	6.51	10.03	10.33	91.5	0.011	0.3	
		4.0	6.62	9.36	10.48	91.4	0.011	0.2	
		5.0	6.53	8.85	10.61	91.5	0.010	0.2	
		6.0	6.50	8.33	10.73	91.4	0.010	0.3	
		7.0	6.33	8.20	10.79	91.5	0.010	0.2	
		8.0	6.21	8.14	10.82	91.3	0.010	0.3	
R-IS-6- UVR	4/26	9.0	6.12	8.05	10.76	90.9	0.010	0.2	0.0
UVIX		10.0	6.14	7.64	10.74	89.8	0.010	0.2	
		11.0	6.17	7.26	10.67	88.4	0.010	0.1	
		12.0	6.06	6.97	10.66	87.8	0.010	0.1	
		13.0	6.01	6.77	10.64	87.2	0.009	0.1	
		14.0	5.95	6.69	10.63	86.9	0.009	0.0	
		15.0	5.92	6.58	10.68	87.0	0.009	0.1	
		16.0	5.86	6.47	10.62	86.3	0.009	0.0	
		17.0	5.86	6.35	10.63	86.1	0.009	0.0	
	-	18.0	5.89	6.12	10.64	85.7	0.009	0.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		19.0	5.88	6.04	10.61	85.3	0.009	0.1	
		20.0	5.86	6.00	10.60	85.1	0.009	0.0	
		21.0	5.86	5.93	10.59	84.8	0.010	0.1	
		22.0	5.85	5.75	10.63	84.8	0.010	0.1	
		23.0	5.81	5.57	10.58	84.0	0.010	0.0	
		24.0	5.80	5.43	10.56	83.6	0.010	0.0	
		25.0	5.79	5.40	10.52	83.2	0.010	0.0	
		26.0	5.81	5.36	10.51	82.9	0.010	0.0	
		27.0	5.82	5.27	10.49	82.7	0.010	0.0	
		28.0	5.84	5.18	10.46	82.3	0.010	0.0	
		29.0	5.86	5.17	10.46	82.3	0.010	0.0	
		30.0	5.83	5.15	10.47	82.3	0.010	0.2	
		31.0	5.78	5.10	10.41	81.7	0.010	0.1	
		32.0	5.79	5.08	10.39	81.5	0.010	0.0	
		33.0	5.81	5.06	10.38	81.4	0.010	0.1	
		34.0	5.82	5.03	10.36	81.2	0.010	0.0	
		35.0	5.84	4.99	10.36	81.1	0.010	0.0	
		36.0	5.85	4.96	10.34	80.9	0.010	0.0	
		37.0	5.87	4.96	10.31	80.7	0.010	998.1	
		surface	10.9	10.4	94	11	6.6	0.3	
		1	10.7	10.4	94	11	6.7	0.3	
		2	10.6	10.4	93	11	6.7	0.2	
		3	10.5	10.4	93	10	6.7	0.3	
R-IS-7-	1/26	4	10.2	10.4	92	10	6.6	0.3	5.8
UVR		5	10.1	10.4	93	10	6.6	0.1	0.0
		6	9.7	10.5	92	10	6.7	0.1	
		7	9.5	10.5	92	10	6.5	0.1	
		8	9.2	10.5	92	10	6.5	0.1	
		9	8.9	10.6	92	10	6.5	0.1	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		10	8.2	10.7	91	9	6.4	0.1	
		11	7.6	10.8	90	9	6.3	0.0	
		12	7.4	10.8	90	9	6.2	0.0	
		13	7.1	10.8	89	9	6.2	0.0	
		14	7.0	10.8	89	9	6.1	0.1	
		15	6.9	10.8	89	9	6.1	0.1	
		16	6.7	10.8	89	9	6.1	0.0	
		17	6.3	10.8	88	9	6.0	0.0	
		18	6.3	10.8	88	9	6.0	0.1	
		19	6.3	10.8	87	9	6.0	0.0	
		20	6.1	10.8	87	9	6.0	0.0	
		21	6.0	10.8	87	9	6.0	0.0	
		22	5.8	10.8	86	9	6.0	0.0	
		23	5.7	10.8	86	9	6.0	0.1	
		24	5.6	10.8	86	9	6.0	0.1	
		25	5.6	10.7	85	9	6.0	0.0	
		26	5.4	10.7	84	9	6.0	0.1	
		27	5.3	10.6	84	9	6.0	0.1	
		28	5.3	10.6	84	9	6.0	0.1	
		29	5.3	10.6	83	9	6.0	0.0	
		30	5.3	10.6	83	9	6.0	0.0	
		31	5.3	10.6	83	9	6.0	0.1	
		32	5.2	10.6	83	9	6.0	0.0	
		33	5.2	10.5	83	9	6.0	0.1	
		34	5.1	10.5	82	9	6.0	0.1	
		35	5.1	10.5	82	9	6.0	0.1	
		36	5.1	10.4	82	9	6.0	0.1	
		37	5.0	10.4	82	9	6.0	0.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		38	5.0	10.4	81	9	6.0	0.0	
		39	5.0	10.4	81	10	6.0	0.0	
		40	4.9	10.4	81	10	5.9	0.0	
		41	4.9	10.4	81	10	5.9	0.1	
		42	4.9	10.3	81	10	5.9	0.0	
		43	4.9	10.3	81	9	5.9	0.0	
		44	4.9	10.3	80	9	5.9	0.1	
		45	4.8	10.3	80	10	5.9	0.1	
		46	4.8	10.3	80	10	5.9	201.8	
		surface	10.4	10.5	95	11	6.5	0.2	
		1	10.4	10.5	94	11	6.5	0.2	
		2	10.3	10.5	94	11	6.5	0.2	
		3	9.8	10.5	93	11	6.6	0.2	
		4	9.8	10.5	93	11	6.4	0.2	
		5	9.7	10.5	93	11	6.4	0.2	
		6	9.7	10.5	93	11	6.4	0.2	
		7	9.6	10.5	92	11	6.4	0.3	
		8	9.5	10.5	92	10	6.4	0.2	
R-IS-8-	4/26	9	8.1	10.7	90	10	6.8	0.1	5.5
UVR	4/20	10	7.8	10.7	90	10	6.4	0.1	5.5
		11	7.5	10.8	90	10	6.2	0.0	
		12	7.5	10.7	90	10	6.1	0.0	
		13	7.3	10.8	89	10	6.0	0.1	
		14	6.9	10.8	89	10	6.0	0.0	
		15	6.8	10.8	88	10	6.0	0.1	
		16	6.5	10.9	89	10	6.0	0.1	
		17	6.4	10.8	87	10	5.9	0.0	
		18	6.1	10.7	86	10	5.9	0.0	
		19	5.9	10.7	86	10	5.9	0.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		20	5.8	10.7	86	10	5.9	0.0	
		21	5.7	10.7	85	10	5.9	0.0	
		22	5.6	10.7	85	10	5.9	0.1	
		23	5.6	10.7	85	10	5.9	0.1	
		24	5.5	10.6	84	10	5.9	0.0	
		25	5.5	10.6	84	10	5.9	0.0	
		26	5.5	10.6	84	10	5.9	0.0	
		27	5.4	10.6	84	10	5.9	0.0	
		29	5.3	10.6	84	10	5.9	0.1	
		30	5.3	10.6	83	10	5.9	0.0	
		31	5.3	10.6	83	10	6.0	0.0	
		32	5.3	10.5	83	10	5.9	0.1	
		33	5.3	10.5	83	10	5.9	472.3	
				Ice House	Reservoir				
		surface	10.2	10.0	89	10	6.7 ^Q	0.2	
		1	10.2	10.0	89	10	6.7 ^Q	0.3	
		2	10.0	10.1	89	10	6.7 ^Q	0.3	
		3	10.1	10.1	89	10	6.7 ^Q	0.2	
		4	10.0	10.1	89	10	6.6 ^Q	0.2	
		5	8.7	10.4	89	9	6.5 ^Q	0.1	
R-IS-9-	4/25	6	7.5	10.7	89	8	6.4 ^Q	0.2	5.5
IHR	4/25	7	7.3	10.7	89	8	6.3 ^Q	0.2	5.5
		8	6.5	10.9	88	8	6.2 ^Q	0.2	
		9	5.8	10.9	87	8	6.2 ^Q	0.1	
		10	5.7	10.9	87	8	6.2 ^Q	0.1	
		11	5.5	10.9	86	8	6.2 ^Q	0.1	
		12	5.4	10.8	86	8	6.2 ^Q	0.1	
		13	5.4	10.8	85	8	6.2 ^Q	0.1	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		14	5.4	10.8	85	8	6.3 ^Q	0.0	
		15	5.3	10.7	85	8	6.3 ^Q	0.0	
		16	5.3	10.7	84	8	6.3 ^Q	0.2	
		17	5.2	10.6	84	8	6.3 ^Q	0.1	
		18	5.1	10.6	83	8	6.3 ^Q	0.0	
		19	5.1	10.5	82	8	6.3 ^Q	0.0	
		20	5.0	10.4	82	8	6.3 ^Q	0.0	
		21	5.0	10.4	81	8	6.3 ^Q	0.1	
		22	5.0	10.3	81	8	6.3 ^Q	0.0	
		23	4.9	10.3	80	8	6.3 ^Q	0.1	
		24	4.9	10.3	80	8	6.3 ^Q	0.1	
		25	4.9	10.2	80	8	6.3 ^Q	0.1	
		26	4.9	10.2	80	8	6.3 ^Q	0.0	
		27	4.9	10.2	80	8	6.3 ^Q	0.0	
		28	4.9	10.2	80	8	6.3 ^Q	0.1	
		29	4.9	10.2	80	8	6.3 ^Q	1.2	
		30	4.9	10.2	79	8	6.3 ^Q	2.6	
		31	4.9	10.1	79	8	6.4 ^Q	0.8	
		32	4.9	10.1	79	8	6.4 ^Q	1.4	
		33	4.9	10.1	79	8	6.4 ^Q	0.2	
		34	4.9	10.1	79	8	6.4 ^Q	0.3	
		35	4.9	10.0	78	8	6.4 ^Q	1.7	
		surface	9.9	10.7	94	10	7.6 ^Q	0.3	
		1	9.9	10.4	92	10	7.4 ^Q	0.3	
R-IS-10-		2	9.9	10.3	91	10	7.3 ^Q	0.3	
IHR	4/25	3	9.8	10.2	90	9	7.3 ^Q	0.4	5.5
		4	9.7	10.3	90	9	7.2 ^Q	0.2	
		5	9.7	10.2	90	9	7.2 ^Q	0.3	
		6	9.4	10.3	90	9	7.2 ^Q	0.3	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		7	9.1	10.4	90	9	7.1 ^Q	0.4	
		8	8.5	10.5	90	9	7.0 ^Q	0.3	
		9	7.7	10.7	90	8	7.0 ^Q	0.2	
		10	6.8	10.8	89	8	6.7 ^Q	0.2	
		11	6.6	10.9	88	8	6.6 ^Q	0.1	
		12	6.4	10.9	88	8	6.5 ^Q	0.2	
		13	6.0	10.8	87	8	6.5 ^Q	0.1	
		14	5.9	10.9	87	8	6.5 ^Q	0.1	
		15	5.8	10.8	86	8	6.5 ^Q	0.1	
		16	5.6	10.7	85	8	6.4 ^Q	225.4	
	4/25	surface	9.8	10.5	92	10	7.7 ^Q	0.2	
		1	9.7	10.3	91	10	7.4 ^Q	0.2	
		2	9.6	10.3	90	9	7.4 ^Q	0.3	
		3	9.5	10.2	90	9	7.3 ^Q	0.2	
		4	9.4	10.2	89	9	7.3 ^Q	0.3	
		5	9.2	10.3	89	9	7.2 ^Q	0.3	
		6	8.0	10.6	89	9	7.2 ^Q	0.3	
		7	7.3	10.8	90	9	7.1 ^Q	0.2	
R-IS-11-		8	7.1	11.0	90	9	6.8 ^Q	0.3	5.5
IHR	4/23	9	6.8	11.0	90	9	6.7 ^Q	0.2	5.5
		10	6.3	11.0	89	8	6.8 ^Q	0.2	
		11	5.9	11.0	88	8	6.6 ^Q	0.1	
		12	5.8	11.0	88	8	6.6 ^Q	0.1	
		13	5.8	10.8	87	8	6.5 ^Q	0.1	
		14	5.7	10.8	86	8	6.5 ^Q	0.1	
		15	5.5	10.8	85	8	6.6 ^Q	0.1	
		16	5.4	10.7	85	8	6.6 ^Q	0.1	
		17	5.2	10.6	84	8	6.5 ^Q	0.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		18	5.1	10.6	83	8	6.5 ^Q	0.1	
		19	5.1	10.5	82	8	6.5 ^Q	0.1	
		20	5.0	10.4	82	8	6.5 ^Q	0.1	
		21	4.9	10.4	82	8	6.5 ^Q	0.1	
		22	4.9	10.3	80	8	6.5 ^Q	0.1	
		23	4.9	10.3	80	8	6.5 ^Q	0.0	
		24	4.9	10.3	80	8	6.5 ^Q	0.0	
		25	4.9	10.2	80	8	6.5 ^Q	304.2	
				Junction I	Reservoir				
		surface	7.8	10.7	90	12	6.2 ^Q	0.1	
		1	7.8	10.7	90	12	6.1 ^Q	0.0	
		2	7.7	10.7	90	12	6.1 ^Q	0.0	
		3	7.5	10.7	89	12	6.1 ^Q	0.0	
		4	7.0	10.8	89	11	6.1 ^Q	0.0	
		5	6.1	10.9	88	11	6.1 ^Q	0.1	
		6	5.9	10.9	87	11	6.1 ^Q	0.0	
		7	5.6	11.0	87	11	6.1 ^Q	0.0	
	4/25	8	5.6	11.0	87	10	6.0 ^Q	0.0	
R-IS-12-		9	5.3	11.0	87	10	6.1 ^Q	0.1	5.5
JR		10	5.3	11.0	87	10	6.1 ^Q	0.1	5.5
		11	5.2	11.0	87	10	6.1 ^Q	0.1	
		12	5.2	11.1	87	10	6.1 ^Q	0.1	
		13	5.2	11.1	87	10	6.2 ^Q	0.1	
		14	5.2	11.1	87	10	6.2 ^Q	0.1	
		15	5.1	11.1	87	10	6.2 ^Q	0.1	
		16	5.1	11.1	87	10	6.2 ^Q	0.1	
		17	5.1	11.1	87	10	6.3 ^Q	0.1	
		18	5.1	11.1	87	10	6.3 ^Q	0.1	
		19	5.0	11.1	87	10	6.3 ^Q	0.1	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		20	5.0	11.1	87	10	6.2 ^Q	0.1	
		21	5.0	11.1	87	10	6.2 ^Q	470.0	
	•			Camino F	Reservoir	-			
		surface	6.1	12.0	97	11 ^Q	4.4	0.2	
		1	6.1	12.0	97	11 ^Q	4.3	0.1	
		2	6.1	12.0	97	11 ^Q	4.2	0.1	
		3	6.1	12.0	97	11 ^Q	4.3	0.0	
D 10 40		4	6.1	12.0	97	11 ^Q	4.3	0.0	
R-IS-13- CR	4/28	5	6.1	12.0	97	11 ^Q	4.3	0.0	8.0
UK		6	6.1	12.0	97	11 ^Q	4.3	0.0	
		7	6.1	12.0	97	11 ^Q	4.3	0.0	
		8	6.1	12.0	97	11 ^Q	4.3	0.0	
		9	6.1	12.0	97	11 ^Q	4.2	0.0	
		10	6.1	12.0	97	11 ^Q	4.3	424.7	
				Slab Creek	Reservoir				
		surface	7.9	12.0	101	23	5.5	0.6	
		1	7.8	12.0	101	23	5.5	0.7	
		2	7.8	12.0	100	23	5.6	0.7	
		3	7.8	12.0	100	23	5.6	0.7	
R-IS-14- SC	4/27	4	7.7	12.0	100	23	5.5	0.9	4.3
30		5	7.7	12.0	100	23	5.6	0.7	
		6	7.7	12.0	100	23	5.6	0.2	
		7	7.7	12.0	100	23	5.6	0.1	
		8	7.6	12.0	100	23	5.6	5.6	
		surface	10.3	11.5	102	21	6.1	0.8	
R-IS-15-	4/07	1	10.3	11.5	102	21	6.1	0.9	2.2
SC	4/27	2	10.3	11.5	102	21	6.0	0.9	3.3
		3	9.6	11.5	101	21	6.1	0.9	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		4	10.3	11.5	101	21	6.1	0.9	
		5	10.0	11.5	102	21	6.0	0.9	
		6	9.0	11.5	101	21	6.0	1.1	
		7	8.6	11.5	100	21	6.0	1.1	
		8	8.5	11.5	101	21	6.0	1.1	
		9	8.4	11.6	99	22	6.0	1.0	
		10	8.4	11.6	99	22	5.8	1.0	
		11	8.4	11.6	99	22	5.8	1.0	
		12	8.3	11.7	99	22	5.8	1.1	
		13	8.2	11.7	99	22	5.8	1.1	
		14	8.2	11.7	99	21	5.9	1.0	
		15	8.2	11.7	99	21	5.8	1.1	
		16	8.1	11.7	99	21	5.8	1.0	
		17	8.1	11.7	99	21	5.8	1.0	
		18	8.1	11.7	99	20	5.8	1.1	
		19	8.0	11.7	99	20	5.7	1.0	
		20	8.0	11.7	99	20	5.8	1.1	
		21	8.0	11.7	99	20	5.8	1.0	
		22	8.0	11.7	99	20	5.8	1.1	
		23	8.0	11.7	99	20	5.9	0.9	
		24	8.0	11.7	99	20	5.8	0.9	
		25	7.9	11.7	98	20	5.9	1.0	
		26	7.9	11.7	98	20	5.9	1.0	
		27	7.9	11.7	98	20	5.8	0.9	
		28	7.9	11.7	98	20	5.9	1.0	
		29	7.9	11.6	98	20	5.9	1.2	
		30	7.8	11.6	98	21	5.9	1.3	
		31	7.8	11.6	98	21	5.8	1.2	

°C = degrees Celsius



m = meter

- mg/L = milligrams per liter
- s.u = standard unit of pH
- uS/cm = microsiemens per centimeter
- NTU = Nephelometric Turbidity Unit

"Q" indicates data qualified based on post-sampling calibration check (see Appendix E).



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
				Loon L	.ake				
		surface	10.6	8.8	79	14	4.8	1.8	
		1	10.6	8.7	78	13	4.8	1.8	
		2	10.6	8.7	78	12	5.0	1.8	
		3	10.5	8.7	78	11	5.2	1.9	
		4	10.5	8.7	78	11	5.2	1.8	
		5	10.5	8.7	78	11	5.3	1.9	
		6	10.5	8.7	78	11	5.4	1.9	
		7	10.5	8.7	78	11	5.6	1.9	5.2
		8	10.5	8.7	78	13	5.6	1.9	
	10/26	9	10.5	8.7	78	9	6.3	1.9	
		10	10.5	8.6	77	12	6.4	1.9	
		11	10.5	8.6	77	9	6.4	2.1	
R-IS-1- LL		12	10.5	8.6	77	9	6.4	1.9	
LL		13	10.5	8.6	77	9	6.4	1.9	
		14	10.5	8.6	77	9	6.4	2.4	
		15	10.5	8.6	77	9	6.5	1.9	
		16	10.5	8.6	77	9	6.4	1.9	
		17	10.4	8.6	77	9	6.5	1.9	
		18	10.1	8.5	76	9	6.5	1.9	
		19	10.2	8.5	76	8	6.5	2.1	
		20	10.1	8.3	74	9	6.4	2.0	
		21	9.8	8.3	73	9	6.4	2.1	
		22	9.8	8.0	71	9	6.3	2.3	
		23	9.7	8.0	70	8	6.1	2.7	-
		24	9.7	7.7	68	31	5.9	66.0	
R-IS-2-	10/26	surface	10.7	9.0	80	9	6.3	2.5	2.7
LL	10/26	1	10.7	8.7	78	9	6.5	1.9	3.7

Table A-2. In situ Vertical Profile Data for UARP Reservoir Sites (Fall).



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		2	10.7	8.7	78	9	6.5	1.9	
		3	10.8	8.7	78	9	6.5	1.8	
		4	10.7	8.7	78	9	6.5	2.3	
		5	10.7	8.7	78	9	6.5	1.9	
		6	10.7	8.7	78	9	6.5	1.9	
		7	10.7	8.7	78	9	6.5	1.9	
		8	10.7	8.6	77	9	6.5	1.9	
		9	10.7	8.6	78	9	6.6	1.9	
		10	10.7	8.6	78	11	6.5	2.1	
		11	10.7	8.6	78	9	6.6	1.9	
		12	10.7	8.6	78	9	6.6	1.9	
		13	10.7	8.7	78	9	6.6	1.9	
		14	10.7	8.6	77	9	6.6	1.9	
		15	10.7	8.6	77	9	6.6	1.9	
		16	10.7	8.6	77	12	6.5	1.9	
		17	10.7	8.6	77	9	6.6	1.9	
		18	10.7	8.6	77	9	6.6	1.9	
		19	10.7	8.6	77	9	6.6	1.9	
		19	10.7	8.6	77	9	6.6	1.9	
		20	10.7	8.5	77	9	6.6	1.9	
		21	10.7	8.5	77	8	6.6	3.1	
		22	10.7	8.4	54	9	6.6	2.2	
		23	10.7	7.5	67	9	6.5	3.0	
		24	10.7	7.8	67	18	6.4	432.0	
		surface	10.8	8.8	79	9	6.6	1.9	
R-IS-3-	10/26	1	10.7	8.7	78	9	6.6	1.9	7.3
LL	10/20	2	10.7	8.7	78	9	6.6	1.9	1.3
		3	10.7	8.6	78	9	6.6	1.9	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		4	10.7	8.6	78	9	6.6	1.9	
		5	10.7	8.6	77	9	6.6	1.8	
		6	10.6	8.6	77	12	6.6	1.9	
		7	10.6	8.6	77	11	6.6	2.2	
		8	10.6	8.6	77	9	6.6	1.9	
		9	10.6	8.6	77	9	6.6	1.9	
		10	10.6	8.6	77	9	6.6	1.9	
		11	10.6	8.6	77	9	6.6	2.0	
		12	10.6	8.5	77	9	6.7	8.1	
				Union Valley	Reservoir				
		surface	14.6	8.9	87	16 ^Q	6.2	1.8	
		1	14.6	8.4	82	15 ^Q	6.6	1.4	
		2	14.5	8.4	82	15 ^Q	6.6	1.4	
		3	14.4	8.4	82	18 ^Q	6.7	1.4	
R-IS-5- UVR	10/25	4	14.3	8.4	82	15 ^Q	6.7	1.4	4.3
UVIX		5	14.3	8.4	82	15 ^Q	6.7	1.4	
		6	14.2	8.4	82	15 ^Q	6.7	1.5	
		7	14.2	8.4	82	15 ^Q	6.7	1.4	
		8	13.7	8.5	81	16 ^Q	6.7	4.3	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		surface	14.6	8.7	85	17 ^Q	7.0	1.3	
		1	14.7	8.2	80	16 ^Q	6.3	1.2	
		2	14.7	8.2	80	16 ^Q	6.2	1.3	
		3	14.6	8.1	80	16 ^Q	6.1	1.3	
		4	14.6	8.1	80	17 ^Q	6.0	1.3	
		5	14.6	8.1	80	15 ^Q	6.0	1.3	
		6	14.7	8.1	80	15 ^Q	6.0	1.3	
		7	14.6	8.1	80	15 ^Q	6.0	1.3	
		8	14.6	8.1	79	15 ^Q	6.0	1.3	
		9	14.6	8.1	79	15 ^Q	6.0	1.3	
		10	14.6	8.0	79	15 ^Q	6.0	1.3	
		11	14.6	8.0	79	15 ^Q	6.0	1.3	
R-IS-6-		12	14.6	8.0	79	15 ^Q	6.0	1.3	4.6
UVR		13	14.6	8.0	79	17 ^Q	6.1	1.3	4.0
		14	14.6	8.0	79	15 ^Q	6.1	1.3	
		15	14.6	8.0	79	15 ^Q	6.1	1.3	
		16	14.6	8.0	79	15 ^Q	6.1	1.3	
		17	14.6	8.0	79	15 ^Q	6.1	1.4	
		18	14.6	8.0	79	15 ^Q	6.1	1.3	
		19	14.6	8.0	79	15 ^Q	6.1	1.3	
		20	14.6	8.0	78	15 ^Q	6.2	1.3	
		21	14.6	7.9	78	15 ^Q	6.2	1.3	
		22	14.5	7.9	77	18 ^Q	6.2	1.4	
		23	14.1	7.9	77	17 ^Q	6.2	1.4	
		24	13.9	7.6	74	15 ^Q	6.1	1.4	
		25	13.8	7.6	73	16 ^Q	6.1	1.4	
R-IS-7-	10/25	surface	14.7	8.9	88	16 ^Q	6.6	1.2	4.0
UVR	10/25	1	14.7	8.3	82	16 ^Q	6.7	1.3	4.0



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		2	14.7	8.3	82	15 ^Q	6.7	1.3	
		3	14.7	8.2	81	15 ^Q	6.8	1.4	
		4	14.7	8.2	81	15 ^Q	6.8	1.4	
		5	14.7	8.2	81	15 ^Q	6.7	1.4	
		6	14.7	8.2	81	15 ^Q	6.7	1.4	
		7	14.7	8.2	81	15 ^Q	6.7	1.3	
		8	14.7	8.2	81	15 ^Q	6.7	1.4	
		9	14.7	8.2	80	14 ^Q	6.7	1.4	
		10	14.7	8.2	80	14 ^Q	6.7	1.3	
		11	14.7	8.2	80	15 ^Q	6.7	1.3	
		12	14.7	8.2	80	14 ^Q	6.7	1.3	
		13	14.7	8.2	80	14 ^Q	6.7	1.3	
		14	14.7	8.1	80	14 ^Q	6.7	1.4	
		15	14.7	8.1	80	14 ^Q	6.7	1.4	
		16	14.7	8.1	80	14 ^Q	6.7	1.4	
		17	14.7	8.1	80	14 ^Q	6.7	1.4	
		18	14.7	8.1	80	14 ^Q	6.7	1.4	
		19	14.6	8.1	80	14 ^Q	6.7	1.4	
		20	14.6	8.1	80	14 ^Q	6.7	1.4	
		21	14.6	8.1	79	15 ^Q	6.7	1.4	
		22	14.4	8.1	79	17 ^Q	6.7	1.4	
		23	14.2	8.0	78	15 ^Q	6.7	1.4	
		24	14.1	7.9	77	15 ^Q	6.7	1.5	
		25	14.0	7.9	77	15 ^Q	6.7	1.5	
		26	13.8	7.9	76	15 ^Q	6.6	1.5	
		27	13.6	7.8	75	15 ^Q	6.6	1.6	
		28	13.5	7.7	74	15 ^Q	6.6	1.5	
		29	13.4	7.7	73	15 ^Q	6.6	1.5	
		30	13.3	7.6	72	15 ^Q	6.6	1.6	



Site ID	2016 Sample Date	Sample Depth (m) 31	Water Temperature (°C) 13.2	Dissolved Oxygen (mg/L) 7.5	Dissolved Oxygen (% sat) 72	Conductivity (uS/cm) 18 ^Q	рН (s.u.) 6.6	Turbidity (NTU) 1.6	Secchi disk (m)		
		32	13.0	6.2	59	52 ^Q	6.2	12.3			
		surface	14.6	8.7	85	17 ^Q	6.4	1.3			
		1	14.6	8.7	85	16 ^Q	6.6	1.3			
		2	14.6	8.1	80	16 ^Q	6.6	1.4			
		3	14.6	8.1	79	16 ^Q	6.6	1.3			
		4	14.6	8.0	79	16 ^Q	6.6	1.4			
		5	14.6	8.0	79	15 ^Q	6.6	1.3			
		6	14.6	8.0	78	15 ^Q	6.6	1.3			
		7	14.6	7.9	78	15 ^Q	6.6	1.3			
		8	14.6	7.9	78	15 ^Q	6.6	1.3			
		9	14.6	7.9	78	15 ^Q	6.6	1.4			
		10	14.6	7.9	78	15 ^Q	6.6	1.3			
		11	14.6	7.9	78	17 ^Q	6.6	1.3			
R-IS-8-	10/25	12	14.6	7.9	78	16 ^Q	6.6	1.3	4.9		
UVR	10/25	13	14.6	7.9	77	14 ^Q	6.6	1.3	4.9		
		14	14.6	7.9	77	14 ^Q	6.6	1.3			
		15	14.6	7.9	78	14 ^Q	6.6	1.3			
	F	16	14.6	7.9	78	14 ^Q	6.6	1.4			
		17	14.6	7.9	78	14 ^Q	6.6	1.4			
				18	14.6	7.9	78	14 ^Q	6.6	1.4	
		19	14.6	7.9	78	14 ^Q	6.6	1.4			
		20	14.6	7.9	77	14 ^Q	6.6	1.4			
		21	14.6	7.8	77	14 ^Q	6.6	1.4			
		22	14.5	7.8	77	14 ^Q	6.6	1.3			
		23	14.5	7.8	76	14 ^Q	6.6	1.3			
		24	14.4	7.7	75	17 ^Q	6.6	1.3			
		25	14.2	7.8	76	16 ^Q	6.6	1.4			



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		26	14.0	7.1	69	14 ^Q	6.5	1.2	
		27	13.9	6.9	57	14 ^Q	6.5	1.2	
		28	13.8	6.8	66	14 ^Q	6.5	1.3	
		29	13.5	6.8	65	16 ^Q	6.5	1.1	
		30	13.3	6.7	64	15 ^Q	6.4	1.2	
		31	13.2	6.7	66	14 ^Q	6.4	1.1	
		32	13.1	6.7	64	14 ^Q	6.4	1.2	
		33	13.0	6.7	64	14 ^Q	6.4	1.2	
		34	13.0	6.7	63	14 ^Q	6.4	1.2	
		35	12.8	6.6	62	16 ^Q	6.3	1.1	
		36	12.7	6.5	61	14 ^Q	6.3	1.1	
		37	12.6	6.5	61	14 ^Q	6.3	1.0	
		38	12.5	6.5	61	14 ^Q	6.3	1.1	
		39	12.5	6.7	63	14 ^Q	6.2	1.2	
		40	12.4	6.7	62	14 ^Q	6.2	1.0	
		41	12.2	6.6	61	14 ^Q	6.2	1.0	
		42	12.2	6.5	61	14 ^Q	6.1	1.0	
		43	12.1	6.5	60	14 ^Q	6.1	1.0	
		44	12.0	6.4	59	14 ^Q	6.0	1.0	
		45	11.9	6.4	60	17 ^Q	6.0	1.0	
		46	11.9	6.4	60	16 ^Q	6.0	1.0	
		47	11.7	6.4	59	14 ^Q	5.9	0.9	
		48	11.6	6.4	59	14 ^Q	6.0	1.0	
		49	11.6	6.3	58	14 ^Q	6.0	1.0	
		50	11.5	6.3	58	15 ^Q	6.0	1.0	
		51	11.6	6.3	57	14 ^Q	6.0	1.0	
		52	11.4	6.2	57	14 ^Q	6.0	0.9	
		53	11.3	6.1	56	14 ^Q	6.0	0.9	
		54	11.0	5.9	53	15 ^Q	5.9	183.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
				Ice House F	Reservoir				
		surface	12.4	9.0	84	16 ^Q	6.2	1.6	
		1	12.5	8.7	81	13 ^Q	6.4	1.6	
		2	12.5	8.6	81	13 ^Q	6.5	1.4	
		3	12.5	8.6	80	12 ^Q	6.5	1.3	
		4	12.5	8.6	80	12 ^Q	6.5	1.3	
		5	12.5	8.6	80	12 ^Q	6.6	1.3	
		6	12.5	8.5	80	12 ^Q	6.6	1.4	
		7	12.5	8.5	80	12 ^Q	6.6	1.4	
		8	12.5	8.5	80	11 ^Q	6.6	1.3	
		9	12.5	8.5	80	11 ^Q	6.6	1.4	
R-IS-9- IHR	10/25	10	12.5	8.5	80	11 ^Q	6.6	1.3	5.8
		11	12.5	8.5	80	11 ^Q	6.6	1.3	
		12	12.5	8.5	80	15 ^Q	6.6	1.3	
		13	12.4	8.5	79	11 ^Q	6.6	2.2	
		14	12.3	8.5	79	11 ^Q	6.6	1.4	
		15	12.3	8.4	78	11 ^Q	6.6	1.3	
		16	12.0	8.4	77	11 ^Q	6.6	1.3	
		17	11.5	8.3	76	11 ^Q	6.6	1.4	
		18	11.2	8.0	73	11 ^Q	6.5	1.5	
		19	10.8	7.6	68	11 ^Q	6.5	1.5	
		20	10.3	7.1	63	11 ^Q	6.4	13.2	
		surface	12.4	8.5	80	16 ^Q	6.4	1.0	
		1	12.5	8.5	79	12 ^Q	6.5	1.4	
R-IS-10-	10/27	2	12.5	8.7	81	12 ^Q	6.6	1.3	5.0
IHR	10/27	3	12.5	8.6	81	11 ^Q	6.6	1.3	5.2
		4	12.5	8.6	80	11 ^Q	6.6	1.3]
		5	12.5	8.6	80	11 ^Q	6.6	1.3	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		6	12.5	8.5	80	11 ^Q	6.6	1.4	
		7	12.5	8.5	80	11 ^Q	6.6	1.3	
		8	12.5	8.5	80	11 ^Q	6.6	1.3	
		9	12.5	8.5	80	11 ^Q	6.6	1.3	
		10	12.5	8.5	80	10 ^Q	6.7	1.4	
		11	12.5	8.5	80	14 ^Q	6.6	1.4	
		12	12.5	8.5	80	10 ^Q	6.6	2.5	
		13	12.5	8.5	80	10 ^Q	6.7	1.5	
		14	12.5	8.5	80	10 ^Q	6.7	10.0	
		surface	12.5	9.0	84	15 ^Q	6.5	1.0	
		1	12.6	9.0	81	11 ^Q	6.7	2.4	
		2	12.6	8.6	81	11 ^Q	6.7	1.4	
		3	12.6	8.6	80	10 ^Q	6.7	1.4	
		4	12.6	8.5	80	10 ^Q	6.7	1.4	
		5	12.6	8.5	80	10 ^Q	6.8	1.3	
		6	12.6	8.5	80	10 ^Q	6.7	1.3	
		7	12.6	8.5	80	10 ^Q	6.8	1.3	
		8	12.6	8.5	80	10 ^Q	6.8	1.3	
R-IS-11-	10/27	9	12.6	8.5	80	10 ^Q	6.8	1.6	4.9
IHR	10/27	10	12.6	8.5	80	10 ^Q	6.7	1.3	4.5
		11	12.6	8.5	80	14 ^Q	6.7	1.3	
		12	12.6	8.5	80	13 ^Q	6.7	1.3	
		13	12.5	8.4	79	10 ^Q	6.7	2.2	
		14	12.5	8.4	79	10 ^Q	6.7	1.4	
		15	12.5	8.3	78	10 ^Q	6.8	1.3	
		16	12.3	8.2	76	10 ^Q	6.8	1.3	
		17	11.3	7.8	70	10 ^Q	6.7	1.4	
		18	10.6	6.9	61	10 ^Q	6.6	1.5	
		19	10.3	6.4	57	10 ^Q	6.6	1.5	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		20	9.9	6.1	54	10 ^Q	6.5	1.6	
		21	9.5	5.8	50	11 ^Q	6.4	1.5	
		22	8.6	5.4	46	11 ^Q	6.3	1.4	
		23	8.2	5.0	42	15 ^Q	6.3	1.4	
		24	8.0	5.0	42	14 ^Q	6.2	1.4	
		25	7.9	4.6	39	11 ^Q	6.1	1.5	
		26	7.7	4.5	37	11 ^Q	6.0	1.4	
		27	7.7	4.4	37	11 ^Q	6.0	1.4	
		28	7.7	4.4	37	11 ^Q	6.0	1.5	
		29	7.6	4.3	36	11 ^Q	6.0	1.6	
		30	7.5	3.9	32	12 ^Q	6.0	1.9	
		31	7.4	3.5	29	12 ^Q	5.9	2.1	
		32	7.3	3.0	25	13 ^Q	5.9	2.5	
		33	7.2	2.3	19	14 ^Q	5.9	2.8	
		34	7.2	1.8	15	14 ^Q	5.8	3.1]
		35	7.2	1.7	14	17 ^Q	5.9	3.1	
		36	7.2	1.3	11	15 ^Q	5.8	6.0	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
				Junction R	eservoir				
		surface	11.3	9.3	85	20 ^Q	5.8	3.7	
		1	11.3	9.5	87	18 ^Q	5.5	1.2	
		2	11.3	9.5	87	18 ^Q	5.5	1.1	
		3	11.3	9.5	87	17 ^Q	5.5	1.1	
		4	11.3	9.5	87	17 ^Q	5.5	1.1	
		5	11.3	9.5	87	17 ^Q	5.6	1.1	
		6	11.3	9.5	87	17 ^Q	5.6	1.1	
		7	11.3	9.5	87	17 ^Q	5.6	1.1	
		8	11.3	9.5	87	17 ^Q	5.7	1.1	
D IC 40		9	11.2	9.5	87	17 ^Q	5.7	1.1	
R-IS-12- JR	10/27	10	11.2	9.5	86	20 ^Q	5.7	1.1	6.1
31		11	11.2	9.5	86	19 ^Q	5.8	1.1	
		12	11.2	9.5	86	17 ^Q	5.8	1.3	
		13	11.2	9.4	86	17 ^Q	5.8	1.3	
		14	11.2	9.4	86	17 ^Q	5.8	1.1	
		15	11.2	9.4	86	17 ^Q	5.8	1.2	
		16	11.2	9.4	86	17 ^Q	5.8	1.1	
		17	11.1	9.4	86	17 ^Q	5.9	1.2	
		18	10.6	9.5	85	18 ^Q	5.9	1.2	
		19	10.2	9.5	84	18 ^Q	5.9	1.8	
		20	10.1	9.5	84	19 ^Q	5.9	103.8	
		•		Camino Re	eservoir				
		surface	11.0	10.5	95	17	6.6	0.7	
		1	11.0	10.5	95	17	6.6	0.7	
R-IS-13-	10/24	2	11.0	10.5	95	17	6.6	0.7	4.0
CR	10/24	3	11.0	10.5	95	17	6.5	0.7	4.9
		4	11.0	10.5	95	17	6.5	0.6	
		5	11.0	10.5	95	17	6.5	0.7	1



Site ID	2016 Sample Date	Sample Depth (m) 6	Water Temperature (°C) 11.0	Dissolved Oxygen (mg/L) 10.5	Dissolved Oxygen (% sat) 95	Conductivity (uS/cm) 17	рН <u>(s.u.)</u> 6.5	Turbidity (NTU) 0.7	Secchi disk (m)
		0	11.0	Slab Creek			0.0	0.7	
		surface	11.1	10.3	94	25 ^Q	7.2	1.9	
		1	11.1	10.8	98	25 ^Q	6.9	2.3	
R-IS-14-	40/04	2	11.1	10.8	98	25 ^Q	6.9	2.5	2.0
SC	10/24	3	11.1	10.8	99	25 ^Q	6.8	2.3	3.0
		4	11.0	10.9	98	25 ^Q	6.8	2.4	
		5	11.0	10.8	98	26 ^Q	6.7	3.4	
		surface	12.7	10.0	94	28 ^Q	6.8	4.7	
		1	12.6	9.9	93	28 ^Q	6.8	5.0	
		2	12.4	9.8	92	28 ^Q	6.8	5.1	
	-	3	12.2	9.7	90	28 ^Q	6.8	5.5	
		4	12.1	9.6	89	28 ^Q	6.8	5.7	
		5	12.0	9.6	89	28 ^Q	6.8	5.9	
		6	12.0	9.6	88	28 ^Q	6.8	6.1	
		7	11.9	9.5	88	28 ^Q	6.8	6.3	
		8	11.7	9.5	88	28 ^Q	6.8	9.5	
S-15-SC	10/24	9	11.6	9.6	89	28 ^Q	6.7	9.7	2.1
3-15-30	10/24	10	11.5	10.0	92	26 ^Q	6.7	12.2	2.1
		11	11.5	10.1	93	26 ^Q	6.7	11.6	
		12	11.4	10.1	93	26 ^Q	6.7	9.3	
		13	11.3	10.2	94	26 ^Q	6.7	7.4	
		14	11.3	10.3	94	26 ^Q	6.7	7.3	
		15	11.3	10.3	94	25 ^Q	6.7	7.8	
		16	11.3	10.3	94	25 ^Q	6.7	7.2	
		17	11.2	10.3	94	25 ^Q	6.6	7.6	
		18	11.2	10.3	94	24 ^Q	6.6	7.6	
		19	11.2	10.3	94	24 ^Q	6.6	7.3	



Site ID	2016 Sample Date	Sample Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Conductivity (uS/cm)	рН (s.u.)	Turbidity (NTU)	Secchi disk (m)
		20	11.2	10.3	94	25 ^Q	6.5	7.3	
		21	11.2	10.3	94	24 ^Q	6.5	6.2	
		22	11.1	10.3	94	24 ^Q	6.5	6.0	
		23	11.1	10.3	93	24 ^Q	6.5	5.9	
		24	11.1	10.3	93	24 ^Q	6.5	5.4	
		25	11.1	10.3	93	24 ^Q	6.5	5.3	
		26	11.1	10.2	93	25 ^Q	6.5	4.9	
		27	11.1	10.2	93	25 ^Q	6.5	4.6	
		28	11.0	10.2	92	25 ^Q	6.6	4.8	
		29	11.0	10.2	92	24 ^Q	6.6	4.7	
		30	11.0	10.2	92	27 ^Q	6.6	4.3]
		31	11.0	10.2	92	26 ^Q	6.6	4.3	
		32	10.9	10.0	90	25 ^Q	6.6	4.8]
		33	10.9	9.7	87	27 ^Q	6.5	129.9	

°C = degrees Celsius

m = meter

mg/L = milligrams per liter

s.u = standard unit of pH

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Unit

"Q" indicates data qualified based on post-sampling calibration check (see Appendix E).



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APPENDIX B Bacteria Results for UARP Reservoir and Riverine Sites



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	Samp	le 1	Samp	le 2	Samp	ole 3	Sampl	e 4	Samp	le 5	Fecal	E. coli
Site ID	Fecal colifor m	E. coli	Fecal colifor m	E. coli	Fecal colifor m	E. coli	Fecal coliform	E. coli	Fecal colifor m	E. coli	coliform geometri c mean ¹	geometri c mean ¹
Bac-5-GCR	<1.8	3.1	17.0	18.5	11.0	<1	2.0	2.0	6.8	6.3	4.7	3.2
Bac-6-GCR	<1.8	<1	33.0	35.9	4.5	10.9	4.5	5.2	<1.8	<1	3.5	3.5
Bac-7-UVR	13.0	8.6	<1.8	<1	<1.8	<1	<1.8	<1	2.0	<1	1.8	0.9
Bac-8-UVR	<1.8	<1	<1.8	9.7	<1.8	<1	<1.8	<1	<1.8	<1	0.9	0.9
Bac-9-UVR	<1.8	<1	<1.8	1.0	2.0	1.0	4.5	2.0	2.0	<1	1.7	0.9
Bac-10-UVR	4.5	1.0	<1.8	3.0	<1.8	<1	<1.8	1.0	11.0	<1	2.0	0.9
Bac-11-JR	7.8	5.3	4.0	6.2	23.0	21.6	17.0	21.6	<1.8	8.6	6.4	10.6
Bac-12-IHR	<1.8	1.0	2.0	1.0	4.5	<1	<1.8	1.0	<1.8	<1	1.5	0.8
Bac-13-IHR	<1.8	<1	2.0	3.1	2.0	<1	4.5	<1	<1.8	2.0	1.7	1.0
Bac-14-BCR	2.0	<1	7.8	2.0	<1.8	<1	94.0	6.3	4.0	1.0	5.6	1.3
Bac-15-SCR	<1.8	<1	<1.8	1.0	17.0	12.0	49.0	2.0	4.5	2.0	5.0	1.9
MDL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	_	_
MRL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	-	_

Table B-1. Bacteria (MPN/100mL) for UARP Sites During the 30-day Period Surrounding Independence Day.

¹ Individual results <MDL were treated as 0.5 x MDL for the geometric mean calculations.

MDL = method detection limit

MRL = method reporting limit



	Samp	le 1	Samp	le 2	Samp	le 3	Samp	le 4	Samp	le 5	Fecal	E. coli
Site ID	Fecal colifor m	E. coli	Fecal colifor m	E. coli	Fecal colifor m	E. coli	Fecal coliform	E. coli	Fecal coliform	E. coli	coliform geometri c mean ¹	geometri c mean ¹
Bac-1-BI	<1.8	<1	<1.8	<1	<1.8	1.0	<1.8	<1	<1.8	<1	0.9	0.6
Bac-2-BI	<1.8	<1	<1.8	<1	<1.8	<1	<1.8	<1	<1.8	<1	0.9	0.5
Bac-3-LL	<1.8	<1	<1.8	<1	<1.8	<1	<1.8	<1	<1.8	<1	0.9	0.5
Bac-4-LL	<1.8	<1	<1.8	<1	2.0	<1	<1.8	<1	<1.8	<1	1.1	0.5
MDL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	-	-
MRL	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	_	_

Table B-2. Bacteria (MPN/100mL) for UARP Sites During the 30-day Period Surrounding Labor Day.

¹ Individual results <MDL were treated as 0.5 x MDL for the geometric mean calculations.

MDL = method detection limit

MRL = method reporting limit



APPENDIX C Metals Bioaccumulation Results for UARP Reservoir Sites



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Species	2016	Fork	Mainht.	Ме	rcury (Hg)	%	Сорре	er (Cu)	Lead	(Pb)	Silver	(Ag)
Common Name	Sampling Date	Length (mm)	Weight (g)	% Moisture	ug/g ww	ug/g dw	Moisture for Cu, Pb, Ag	ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
					LOC	N LAKE (M-1-LL)						
		198	170.0	80%	0.018	0.090	79%	0.14	0.69	< 0.002	< 0.01	< 0.003	< 0.02
Rainbow	8/30	204	85.0	79%	0.014	0.068	79%	0.19	0.87	< 0.002	< 0.01	< 0.003	< 0.02
trout	6/30	370	610.0	77%	0.012	0.052	77%	0.15	0.64	< 0.002	< 0.01	< 0.003	< 0.02
		373	595.0	81%	0.017	0.089	77%	0.14	0.64	0.015	0.07	< 0.003	< 0.02
		450	1,115.0	76%	0.344	1.440	75%	0.22	0.90	0.003	0.01	< 0.003	< 0.02
Brown trout	8/30	436	900.0	77%	0.206	0.888	76%	0.17	0.70	< 0.002	< 0.01	< 0.003	< 0.02
		496	1,310.0	77%	0.416	1.790	76%	0.15	0.62	< 0.002	< 0.01	< 0.003	< 0.02
				GEF			VOIR (M-1-GO	CR)					
		182	84.0	79%	0.062, 0.054	0.294, 0.256	77%	0.32	1.41	< 0.002	< 0.01	< 0.003	< 0.02
		300	305.0	77%	0.060	0.255	75%	0.27	1.10	< 0.002	< 0.01	< 0.003	< 0.02
		282	220.0	78%	0.058	0.264	77%	0.23	0.97	< 0.002	< 0.01	< 0.003	< 0.02
		312	305.0	78%	0.060	0.269	77%	0.24	1.03	0.004	0.02	< 0.003	< 0.02
		280	275.0	79%	0.084	0.394	78%	0.19	0.85	0.003	0.01	< 0.003	< 0.02
		300	290.0	78%	0.057	0.257	77%	0.16	0.71	0.011	0.05	< 0.003	< 0.02
		295	345.0	79%	0.041	0.192	78%	0.21	0.95	< 0.002	< 0.01	< 0.003	< 0.02
Brown trout	8/31	283	365.0	78%	0.073	0.327	77%	0.27	1.13	< 0.002	< 0.01	< 0.003	< 0.02
		276	210.0	79%	0.171	0.799	78%	0.14	0.64	< 0.002	< 0.01	< 0.003	< 0.02
		266	195.0	78%	0.088	0.396	78%	0.14, 0.13	0.57, 0.64	< 0.002	< 0.01	< 0.003	< 0.02
		280	260.0	77%	0.069	0.297	76%	0.24	1.00	< 0.002	< 0.01	< 0.003	< 0.02
		254	215.0	78%	0.055	0.244	78%	0.21, 0.18	0.79, 0.92	< 0.002	< 0.01	< 0.003	< 0.02
		300	330.0	76%	0.047	0.196	75%	0.27	1.06	< 0.002	< 0.01	< 0.003	< 0.02
		225	129.0	79%	0.029	0.138	79%	0.15	0.71	< 0.002	< 0.01	< 0.003	< 0.02

Table C-1. Fish tissue metals concentrations for UARP reservoirs.



Species	2016	Fork	Weight	Ме	rcury (Hg)	%	Сорре	er (Cu)	Lead	(Pb)	Silver	(Ag)
Common Name	Sampling Date	Length (mm)	Weight (g)	% Moisture	ug/g ww	ug/g dw	Moisture for Cu, Pb, Ag	ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
				UNIC	ON VALLE	EY RESER	VOIR (M-1-UV	′R)	1			1	
		226	182.8	80%	0.097	0.474	79%	0.14	0.65	< 0.002	< 0.01	< 0.003	< 0.02
		172	75.4	80%	0.076	0.377	78%	0.20	0.91	0.004	0.02	< 0.003	< 0.02
		170	68.4	81%	0.078	0.407	79%	0.15	0.70	< 0.002	< 0.01	< 0.003	< 0.02
		382	935.0	78%	0.713	3.180	77%	0.15	0.63	< 0.002	< 0.01	< 0.003	< 0.02
Smallmouth	8/30, 9/1	330	630.0	79%	0.306	1.460	77%	0.14	0.60	< 0.002	< 0.01	< 0.003	< 0.02
bass	0/30, 9/1	275	310.0	81%	0.150	0.773	79%	0.18	0.83	< 0.002	< 0.01	< 0.003	< 0.02
		285	350.0	78%	0.163	0.748	78%	0.16	0.74	< 0.002	< 0.01	< 0.003	< 0.02
		240	220.0	80%	0.171	0.838	79%	0.12	0.58	< 0.002	< 0.01	< 0.003	< 0.02
		240	160.0	82%	0.297	1.660	82%	0.15	0.82	< 0.002	< 0.01	< 0.003	< 0.02
		205	120.0	79%	0.137	0.667	79%	0.16	0.74	< 0.002	< 0.01	< 0.003	< 0.02
		230	172.2	79%	0.017	0.081	78%	0.20	0.93	< 0.002	< 0.01	< 0.003	< 0.02
		253	155.3	77%	0.049	0.217	76%	0.25	1.04	0.011	0.05	< 0.003	< 0.02
		270	255.0	78%	0.016	0.073	77%	0.14	0.64	< 0.002	< 0.01	< 0.003	< 0.02
		275	650.0	77%	0.017	0.073	76%	0.16	0.65	< 0.002	< 0.01	< 0.003	< 0.02
		327	415.0	78%	0.021	0.094	76%	0.14	0.59	< 0.002	< 0.01	< 0.003	< 0.02
		330	355.0	78%	0.019	0.087	78%	0.19	0.84	< 0.002	< 0.01	< 0.003	< 0.02
		335	385.0	79%	0.013	0.063	78%	0.16	0.72	< 0.002	< 0.01	< 0.003	< 0.02
Rainbow	_ / /.	360	675.0	78%	0.018	0.079	77%	0.21	0.93	< 0.002	< 0.01	< 0.003	< 0.02
trout	8/31, 9/1	327	375.0	78%	0.012	0.053	77%	0.19	0.82	< 0.002	< 0.01	< 0.003	< 0.02
		330	555.0	77%	0.017	0.074	76%	0.21	0.85	< 0.002	< 0.01	< 0.003	< 0.02
		225	139.7	80%	0.016	0.080	78%	0.21	0.92	0.018	0.08	< 0.003	< 0.02
		315	380.0	78%	0.017	0.078	77%	0.15	0.63	< 0.002	< 0.01	< 0.003	< 0.02
		360	610.0	75%	0.018	0.073	75%	0.16	0.64	< 0.002	< 0.01	< 0.003	< 0.02
		306	330.0	78%	0.013	0.058	77%	0.21	0.92	< 0.002	< 0.01	< 0.003	< 0.02
		295	280.0	79%	0.013, 0.014	0.061, 0.066	78%	0.18	0.84	< 0.002	< 0.01	< 0.003	< 0.02
		350	480.0	80%	0.015	0.077	77%	0.15	0.64	< 0.002	< 0.01	< 0.003	< 0.02



Species	2016	Fork	Weight	Ме	rcury (Hg)	% Moisture	Coppe	er (Cu)	Lead	(Pb)	Silver	(Ag)
Common Name	Sampling Date	Length (mm)	(g)	% Moisture	ug/g ww	ug/g dw	for Cu, Pb, Ag	ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
		333	405.0	78%	0.011	0.049	77%	0.22	0.93	< 0.002	< 0.01	< 0.003	< 0.02
		335	460.0	76%	0.015	0.062	75%	0.15	0.61	< 0.002	< 0.01	< 0.003	< 0.02
		211	113.0	73%	0.068	0.25	73%	0.27	1.01	< 0.002	< 0.01	< 0.003	< 0.02
Kakanaa	0/24 0/4	209	111.5	73%	0.080	0.298	72%	0.23	0.81	< 0.002	< 0.01	< 0.003	< 0.02
Kokanee	8/31, 9/1	211	115.5	73%	0.069	0.260	72%	0.26	0.94	< 0.002	< 0.01	< 0.003	< 0.02
		212	128.6	65%	0.247	0.700	69%	0.28	0.88	< 0.002	< 0.01	< 0.003	< 0.02
Brown trout	9/1	486	133.5	78%	0.145	0.656	77%	0.26	1.11	< 0.002	< 0.01	< 0.003	< 0.02
		647	4,310.0	72%	0.202	0.714	71%	0.32	1.10	< 0.002	< 0.01	< 0.003	< 0.02
		508	1,580.0	78%	0.128	0.579	78%	0.21	0.93	0.017	0.07	< 0.003	< 0.02
Lake trout	8/31	385	690.0	77%	0.075	0.333	74%	0.20	0.78	0.011	0.04	< 0.003	< 0.02
		364	545.0	76%	0.053	0.218	76%	0.22	0.92	< 0.002	< 0.01	< 0.003	< 0.02
		278	175.0	80%	0.092	0.451	79%	0.27	1.25	< 0.002	< 0.01	< 0.003	< 0.02
				IC	E HOUSE	RESERV	OIR (M-1-IHR)						
		284	230.0	80%	0.041, 0.042	0.202, 0.207	79%	0.20	0.99	< 0.002	< 0.01	< 0.003	< 0.02
Rainbow		264	180.0	79%	0.039	0.187	79%	0.21	0.96	< 0.002	< 0.01	< 0.003	< 0.02
trout	8/29	271	280.0	78%	0.013	0.059	78%	0.22	1.01	< 0.002	< 0.01	< 0.003	< 0.02
		273	210.0	79%	0.029	0.138	77%	0.21	0.91	< 0.002	< 0.01	< 0.003	< 0.02
		385	740.0	78%	0.013	0.060	76%	0.24	0.97	< 0.002	< 0.01	< 0.003	< 0.02
		586	2,125.0	76%	0.387	1.640	76%	0.18	0.75	< 0.002	< 0.01	< 0.003	< 0.02
Brown trout	8/29	440	1,290.0	76%	0.255	1.080	75%	0.19	0.75	0.015	0.06	< 0.003	< 0.02
		410	955.0	78%	0.585	2.610	77%	0.24	1.05	< 0.002	< 0.01	< 0.003	< 0.02



Species	2016	Fork	Mainht.	Ме	ercury (Hg)	%	Coppe	er (Cu)	Lead	(Pb)	Silver	(Ag)
Common Name	Sampling Date	Length (mm)	Weight (g)	% Moisture	ug/g ww	ug/g dw	Moisture for Cu, Pb, Ag	ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
			L		CAMINO	RESERVO	DIR (M-1-CR)			L		L	
Lahontan		233	140.7	79%	0.045, 0.045	0.213, 0.211	78%	0.17	0.74	< 0.002	< 0.01	< 0.003	< 0.02
cutthroat	8/30	225	112.6	80%	0.035	0.176	78%	0.16	0.78	< 0.002	< 0.01	< 0.003	< 0.02
trout		225	139.7	78%	0.029	0.134	77%	0.19	0.82	< 0.002	< 0.01	< 0.003	< 0.02
		275	200.0	78%	0.038	0.174	77%	0.21	0.92	< 0.002	< 0.01	< 0.003	< 0.02
		245	165.0	77%	0.034	0.150	76%	0.15	0.61	< 0.002	< 0.01	< 0.003	< 0.02
		266	225.0	77%	0.038	0.166	76%	0.21	0.88	< 0.002	< 0.01	< 0.003	< 0.02
		247	180.0	77%	0.040	0.174	75%	0.27	1.10	< 0.002	< 0.01	< 0.003	< 0.02
		245	180.0	78%	0.042	0.189	77%	0.19	0.81	0.017	0.07	< 0.003	< 0.02
Brown trout	8/30	247	180.0	77%	0.044, 0.044	0.195, 0.195	77%	0.22	0.95	< 0.002	< 0.01	< 0.003	< 0.02
		300	350.0	77%	0.092	0.407	76%	0.22	0.91	< 0.002	< 0.01	< 0.003	< 0.02
		278	250.0	78%	0.048	0.221	77%	0.22	0.97	< 0.002	< 0.01	< 0.003	< 0.02
		285	280.0	78%	0.064	0.286	77%	0.24	1.03	< 0.002	< 0.01	< 0.003	< 0.02
		305	340.0	78%	0.034	0.154	76%	0.23	0.98	< 0.002	< 0.01	< 0.003	< 0.02
				SL/	AB CREE	K RESER	/OIR (M-1-1SC	R)					
		188	65.0	78%	0.033	0.149	77%	0.20	0.89	< 0.002	< 0.01	< 0.003	< 0.02
Rainbow	8/31	173	60.0	77%	0.035	0.152	75%	0.30	1.23	0.005	0.02	< 0.003	< 0.02
trout	0/31	195	80.0	78%	0.025	0.112	76%	0.20	0.86	< 0.002	< 0.01	< 0.003	< 0.02
		249	180.0	78%	0.036	0.161	77%	0.26	1.12	< 0.002	< 0.01	< 0.003	< 0.02
		461	970.0	77%	0.516	2.270	77%	0.14	0.60	< 0.002	< 0.01	< 0.003	< 0.02
		311	280.0	81%	0.312, 0.320	1.640, 1.680	79%	0.13	0.62	< 0.002	< 0.01	< 0.003	< 0.02
Sacramento	8/31	296	235.0	82%	0.276	1.570	80%	0.13, 0.11	0.55, 0.66	< 0.002	< 0.01	< 0.003	< 0.02
pikeminnow	0/31	286	190.0	81%	0.182	0.937	78%	0.17	0.78	< 0.002	< 0.01	< 0.003	< 0.02
		238	120.0	79%	0.125	0.590	78%	0.16	0.73	< 0.002	< 0.01	< 0.003	< 0.02
		230	95.0	81%	0.125	0.647	79%	0.26	1.26	< 0.002	< 0.01	< 0.003	< 0.02
		201	75.0	79%	0.155	0.747	79%	0.18	0.86	< 0.002	< 0.01	< 0.003	< 0.02



Species	2016	Fork	Waight	Me	rcury (Hg)	% Moisture	Сорре	er (Cu)	Lead	(Pb)	Silver	(Ag)
Common Name	Sampling Date	Length (mm)	Weight (g)	% Moisture	ug/g ww	ug/g dw	for Cu, Pb, Ag	ug/g ww	ug/g dw	ug/g ww	ug/g dw	ug/g ww	ug/g dw
		505	1,415.0	77%	0.267	1.180	76%	0.20	0.82	< 0.002	< 0.01	< 0.003	< 0.02
Brown trout	8/31	386	605.0	77%	0.124	0.538	76%	0.21	0.89	< 0.002	< 0.01	< 0.003	< 0.02
Brown trout	0/31	230	125.0	78%	0.046	0.211	78%	0.20	0.89	< 0.002	< 0.01	< 0.003	< 0.02
		241	145.0	77%	0.406	1.800	77%	0.21	0.90	< 0.002	< 0.01	< 0.003	< 0.02

ug/g= micrograms per gram

ww= wet weight

dw= dry weight

Bold indicates values that are greater than the Office of Environmental Health Hazard Assessment's (OEHHA's) Advisory Tissue Level (ATL) of 0.07 ug/g methylmercury wet weight (Klasing and Brodberg 2008).

Bold and italic indicates values that are greater than OEHHA's ATL of 0.44 ug/g wet weight (Klasing and Brodberg 2008).



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APPENDIX D In situ Field Data Sheets



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Note: Datasheet format for 2016 changed after the February survey. Disregard conductivity (us/cm), turbidimeter, and Secchi disk results.

	SMUD In Situ Monitoring in the Upper American River	Page 1 of 3
Stillwater Sciences	Project and Chili Bar Project	

Instrument(S) used: 451 6920 Personnel: KKC + BTH

li ictivity	n situ	The sector of the sector		
ctivity				
pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
μS/cm	NTU	NTU	m	
9.0 5.46	0	-	0.5	Bottom
		0.6	0.6	0.6

Date Pho Note	os:	8/20	- DS				10:50A Sunny, (
						n situ			
Temp	D	0	Conc	luctivity	pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	
Temp (C)	Di (mg/l)	0 (%)	Conc mS/cm	luctivity μS/cm	рН	Turbidity (YSI) NTU		Secchi disk m	Notes

Date Pho Note	tos: U	B 20 5- DS	عاد			Time: Weather:	II · 10 AN Sunny, C	001	
Temp		00	Cond	uctivity	рн	n situ Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notos
remp		10000	mS/cm	µS/cm		NTU	NTU	m	Notes
(C)	(mg/l)	(%)	ms/cm	μο/οπ		MIU	NIO		



Page <u>2</u> of <u>3</u> SMUD In situ Monitoring in the Upper ((0)) American River Project and Chili Bar Project Stillwater Sciences

Instrument	(s) used:	YSI	6920			Crew	BTH + KKC
Site	Location:	IS-I	3-SC			GPS:	
Date	: 2/	8/2016				Time:	11:50 AM
Phot Note	os: US	- DS				Weath	er: Sunny, Warm
				In situ			
	T		1		-		
Temp	in the second	0	Conductivity	Specific Conductance	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
6.33	1.1/	90.1	20.0	0.032	6.82	.8	Secchidisk: .5 m bottom
Site	location		141 66			GPS:	around or of
	Location:						10120.014
Date		8/2016					12:20 PM
Phot	os: US	- DS				Weath	er: Sunny, warm
Note	s:						_
			CHICKER .	and the market	4 may 1 1 1 1	a columna a	D Anna A
			- 1796 i /	In situ	No.	1.000	A CARLES AND A CARLES
Temp	1	0	Conductivity	Specific Conductance	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
6.66	10.78	88.4	34.0	0.053	6.96	.7	secchidisk: .25 m bottom
			Trans.				
	1						
Site	_ocation:	IS -1	6-SFAR	-		GPS:	s setors
Date	21	8/2016					2:00 PM
Photo	DS: US	-DS				Weath	er: Sunny, cool
Note	S:			10.122	107. 	and the second	U
			(carte)	In situ	10	and and	M 10000 100
Temp	D	0	Conductivity	Specific Conductance	рН	Turbidity	Notes

secchidisk: 1.5 m

bottom

(NTU)

.9

(s.u.)

7.08

(°C)

4.85

(%)

84.4

(mg/L)

10.82

(µS/cm)

25.0

(mS/cm)

0.046



Stillwater Sciences

SMUD In Situ Monitoring in the Upper American River Project and Chili Bar Project

Page <u>3</u> of <u>3</u>

Instrument(S) used: _________51_6920

Personnel: BTH + KKC

Site Location: IS- IS- SFAR Date: 2/8 2016 Photos: US- DS 05 Notes:							2:15PM Sunny, C	Coc 1	
					li	n situ			
Temp	D	0	Condu	uctivity	рН	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	μS/cm		NTU	NTU	m	
6.20	11.46	92.8	0.099	64.0	6.96	1.1	-	Im	Bottom

Date: 28/2016 Photos: 05-DS							3:00 PM			
Phot Note		5-05				Weather:	SURNY, C	00		
	1				1	n situ	Turbidity			
Temp		DO		uctivity	pH	Turbidity (YSI)	(Turbidimeter)	Secchi disk	Notes	
(C)	(mg/l)	(%)	mS/cm	μS/cm		NTU	NTU	m		
.06	10.75	88.T	0.043	28.0	6.85	46.0	_	0.1	all the	Muddy, Cl Brown

Site Lo Date: Photo Notes	s:	IS- B[20] S-DS	- 19 - SF 6	AR			AD27): 4:15PM Sunny, (്കി	
					1	n situ			
Temp	0	00	Cone	luctivity	рН	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
(C)	(mg/l)	(%)	mS/cm	μS/cm	•	NTU	NTU	m	
4.99	11.56	90.9	0.056	34.0	7.67	4.9	-	0.5	Battom



Note: Datasheet format for 2016 changed after the February survey. Disregard conductivity (us/cm), turbidimeter, and secchidrisk results.

SMUD In Situ Monitoring in the Upper American RiverStillwater SciencesProject and Chill Bar Project

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Page _ of _

Instrument(S) used: 454 6920

11.56 83.7

2.08

Personnel: BTH + KKC

0.25

6. Hom

Site Lo	ocation:	tion: IS-6.GC					UTM (NAD27):			
Date: Photo Notes	os:	2/9/16 ~s/ds					11: 38 Suany, me	- 65	°F	
						In situ				
Temp		00	Cone	ductivity	pH	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes	
(C)	(mg/l)	(%)	m\$/cm	μS/cm		NTU	NTU	m		

2.0

5.85

Date		2/5/16					12:12		
Phot Note		s / d	\$			Weather:	srumy,	WErm	
					L	n situ			
Temp		DO Conductiv		uctivity	рН	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	Notes
Service Party								m	and the second
(C)	(mg/l)	(%)	mS/cm	μS/cm		NTU	NTU		

Date: Photo Note:	os:	19/16 s/ds		1		Time: <u>)3;50</u> Weather: <u>Symp, weather</u> , 70°F			
						n situ	Tuskidite	1	
	DO		Cond	luctivity	-11	Turbidity (YSI)	Turbidity (Turbidimeter)	Secchi disk	
Temp		and the second second second			I DH				Notes
Temp (C)	(mg/l)	(%)	mS/cm	μS/cm	рН	NTU	NTU	m	Notes
	(mg/l)		ms/cm 0.047	μS/cm 31	6.83	NTU). La			L. 4



SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page of 4 Date: 4/25/16 Time: 10:10 AM

Instrument used: <u>451 6920</u> Water depth: <u>102 ft</u>

Reservoir - Water Quality Vertical Profiles

Site Location: UARP - R - TS - 9 - IHR

Lat/Long (NAD83):

 (\odot)

Stillwater Sciences

Personnel: BTH +KKC

Site Notes: <u>Cloudy</u>, light snow, cold, slight breeze

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	10.19	10.04	89.3	0.01	6.70	0.2		
3.3	1	10.20	10.03	89.3	0.01	6.69	0.3		
6.6	2	10.03	10.05	89.4	0.01	6.69	0.3		
9.8	3	10.11	10.05	89.3	0.01	6.68	0.2		
13.1	4	10.02	10.65	89.1	0.01	6.64	0.2		
16.4	5	8.71	10.38	89.2	6.009	6.50	0.1		
19.7	6	7,50	10.65	88.8	0.008	6.37	0.2		
23.0	7	7.30	10.70	88.7	0.008	6.25	0.2		
26.2	8	6.52	10.87	88.4	0.008	6.23	0.2		
29.5	9	5.82	10.91	87.1	0.008	6.21	0.1		
32.8	10	5.69	10.89	86.8	0.008	6.19	0.1		
36.1	11	5.49	10.80	86.1	0.008	6.20	0.1		
39.4	12	5.44	10.84	85.7	0.008	6.21	0.1		
42.7	13	5,42	10.80	85.4	0.008	6.24	0.1		
45.9	14	5.36	10.76	84.9	0.008	6.25	0.0		
49.2	15	5.30	10.72	84.5	0.008	6.27	0.0		
52.5	16	5.25	10.67	84.1	0.008	6.32	0.2		
55.8	17	5.23	10.62	83.6	0.008	6.31	0.1		
59.1	18	5.14	10.59	83.2	0.068	6.31	0.0		
62.3	19	5.06	10.50	82.3	0.008	6.31	0.0		
65.6	20	4.99	10.44	81.6	0.008	6.32	0.0		
68.9	21	4.97	10.43	81.1	0.008	6.31	0.1		
72.2	22	4.95	10.33	80.8	0.008	6.29	0.0		
75.5	23	4.93	10.29	80.4	0.008	6.29	0,1		
78.7	24	4.92	10.25	80.0	0.008	6.32	0.1		
82.0	25	4.92	10.22	79.9	0.008	6.27	0.1		
85.3	26	4.92	10.20	79.7	0.008	6.30	0.0		
88.6	27	4.92	10.19	79.6	0.008	6.31	0.0		
91.9	28	4,92	10,19	79.6	0.008	6.32	011		
95.1	29	4,91	10.19	79.6	0.008	6.32	1.2		
98.4	30 31	4.91	10.15	79.3	0.008	6.31	2.6		
101.7	31	4.91	10.14	79.2	0.008	6.35	0.8		
105.0	32	4.91	10.13	79.1	0.008		0.2		
108.3 111.5	34	4.91	10,12	79.1	0.008	6.41	0.2		
111.5	35	4.91	10.04	78.4	0.008	6.39	1.7		

D-7



6.3

Stillwater Sciences

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page 2 of 4 Date: 4/25/16 Time: 11:30 AM

Secchi (ft): <u>18</u>

 Reservoir - Water Quality Vertical Profiles

 Instrument used: <u>4516926</u>

 Water depth: <u>56 ft</u>

Site Location: <u>UARP R-IS-10-IHR</u> Lat/Long (NAD83):

Personnel: ______H + KKC

Site Notes: Snowing, Catt, windy

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	9.89	10.73	94.3	0.01	7.59	0.3		
3.3	1	9.93	10.42	921	0.01	7.42	0.3		
6.6	2	9,93	10.26	90.6	0.01	7.30	0.3		
9.8	3	9.82	10.24	90.3	0.009	7.27	0.4		
13.1	4	9.73	10,25	90.2	0.009	T.18	0.2		
16.4	5	9.72	10,23	90.0	0,009	7.66	0.3		
19.7	6	9:36	10.34	90.1	0.009	7.22	0.3		
23.0	7	9.09	10.39	90.0	0.009	7.06	0.4		
26.2	8	8.53	10.54	90.1	0.009	7.02	0.3		
29.5	9	7.67	10,70	89.6	0.008	6.95	0.2		
32.8	10	6.80	10.81	88.6	0.008	6.73	0.2		
36.1	11	6.56	10.86	88.4	0.008	6.63	0.1		
39.4	12	6.38	16.85	87.9	0.008	6.54	0.2		
42.7	13	6.01	10.84	87.1	0.008	6.53	0.1		
45.9	14	5.87	10.89	87.2	0.008	6.50	0.1		
49.2	15	5.77	10.78	86.0	0.008	6.45	0.1 .		
52.5	16	5.57	10.74	85.1	0.009	6.43	225.4		BOTTOM
55.8	17								
59.1	18					8.2			
62.3	19								
65.6	20								
68.9	21								2
72.2	22								
75.5	23								
78.7	24								
82.0	25								
85.3	26								
88.6	27								
91.9	28								
95.1	29								
98.4	30								
101.7	31								
105.0	32								
108.3	33							8	
111.5	34								



Stillw	SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project Page												
	Personnel: <u>BTH + KKC</u> Site Notes: <u>Partly cloudy, celd, light breeze</u> , lightly Snawing												
			0	J	C.		0	5	{				
									1. 				
Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water					
									Notes				
(ft)	(m)	(°C)	(ma/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample					
(ft) surf		(°C) 9.77	(mg/L)	(%)	(μS/cm)	(s.u.)	(NTU)	Sample					
. ,		9.77	10,51	92.4	0.01	7.69	0.2	Sample					
surf	ace		and the second	92.4	0.01		0.2	Sample					
surf 3.3	ace 1	9,72	10,51 10,29	92.4	0.01	7.69 7.44 7.43	0.2	Sample					
surf 3.3 6.6	ace 1 2	9.77 9.72 9.60	10,51 10,29 10,26	92.4 90.5 89.9	0.01 0.01 0.009	7.69 7.44	0.2	Sample					
surf 3.3 6.6 9.8	ace 1 2 3	9,77 9,72 9,60 9,53	10,51 10,29 10,26 10,24	92.4 90.5 89.9 89.8	0.01 0.01 0.009 0.009	7.69 7.44 7.43 7.31	0.2 0.2 0.3 0.2	Sample					
surf 3.3 6.6 9.8 13.1	ace 1 2 3 4	9,77 9,72 9,60 9,53 9,42	10,51 10,29 10,26 10,24 10,23	92.4 90.5 89.9 89.8 89.4	0.01 0.01 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33	0.2 0.2 0.3 0.2 0.3	Sample					
surf 3.3 6.6 9.8 13.1 16.4	ace 1 2 3 4 5	9,77 9,72 9,60 9,53 9,42 9,42	10,51 10,29 10,25 10,24 10,23 10,23	92.4 90.5 89.9 89.8 89.4 89.4	0.01 0.00 0.009 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33 7.24	0.2 0.2 0.3 0.3 0.3 0.3	Sample					
surf 3.3 6.6 9.8 13.1 16.4 19.7	ace 1 2 3 4 5 6	9,77 9,72 9,60 9,53 9,42 9,42 9,20 8,03	10,51 10,29 10,26 10,24 10,23 10,28 10,28	92.4 90.5 89.9 89.8 89.4 89.4 89.4 89.4	0.01 0.009 0.009 0.009 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33 7.24 7.16	0.2 0.2 0.3 0.2 0.3 0.3 0.3 0.3	Sample					
surf: 3.3 6.6 9.8 13.1 16.4 19.7 23.0	ace 1 2 3 4 5 6 7	9.77 9.72 9.60 9.53 9.42 9.20 8.03 7.28 7.11 6.77	10,51 10,29 10,26 10,23 10,23 10,28 10,58 10,58	92.4 90.5 89.9 89.8 89.4 89.4 94.4 90.0 90.4 90.2	0.01 0.00 0.009 0.009 0.009 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33 7.24 7.16 7.14	0.2 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Sample					
surf. 3.3 6.6 9.8 13.1 16.4 19.7 23.0 26.2	ace 1 2 3 4 5 6 7 8	9,77 9,72 9,60 9,53 9,42 9,20 8,03 7,28 7,11	10,51 10,29 10,26 10,23 10,23 10,28 10,58 10,58 10,84 10,95	92.4 90.5 89.9 89.9 89.4 89.4 89.4 90.0 90.4	0.01 0.00 0.009 0.009 0.009 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33 7.24 7.16 7.14 6.83	0.2 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Sample					
surf. 3.3 6.6 9.8 13.1 16.4 19.7 23.0 26.2 29.5	ace 1 2 3 4 5 6 7 8 9	9.77 9.72 9.60 9.53 9.42 9.20 8.03 7.28 7.11 6.77	10,51 10,29 10,24 10,23 10,23 10,28 10,58 10,58 10,84 10,95 11,01	92.4 90.5 89.9 89.8 89.4 89.4 94.4 90.0 90.4 90.2	0.01 0.00 0.009 0.009 0.009 0.009 0.009 0.009 0.009	7.69 7.44 7.43 7.31 7.33 7.24 7.16 7.14 6.83 6.73	0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.2 0.3 0.2 0.2	Sample					

6.52

6.51

6.55

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6.49

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0.1

0.1

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0.0

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0.1

0.1

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0.1

0.0

0.0

304.2

BOTTOM

42.7

45.9

49.2

52.5

55.8

59.1

62.3

65.6

68.9

72.2

75.5

78.7

82.0

85.3

88.6

91.9

95.1

98.4

101.7

105.0

108.3

111.5

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26 27

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5.76

5.67

5.52

5.35

5.24

5.14

5.05

4,98

4.89

4.88

4.86

4.85

4.85

10.84

10.79

10.76

10.71

10.55

10.31

10.28

10.27

10.24

86.5

85.9

85.3

84.6

82.9

80.4

80.2

80.0

79.9

10.62 83.6

10.47 82.0

10.41 81.5

10.44 81.5

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Stillwater Sciences

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(Gaz)	SMUD In situ Monitoring in the Upper	Page 4	of _4
water Sciences	American River Project and Chili Bar Project	Date: 4/	25/16
	Reservoir - Water Quality Vertical Profiles		IN OFFI
	VARP R-IS-12-JR	Instrument used: Water depth:	
Lat/Long (NAD83):		Secchi (ft):	18ff

Personnel: BTH + KKC

Site Notes: Partly cloudy Very winds Cold.

Dep	oth	Temp	D	0	Conductivity	рН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(μS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	7.78	10,00	90.3	0.012	6.24	0.1		
3.3	1	7.81	10.72	90.1	0.012	6.14	0.0		
6.6	2	7.74	10.70	99.7	0.012	6.10	0.0		
9.8	3	7.52	10.71	89.4	0.012	6.13	0.0		
13.1	4	7.01	10:77	88.7	0.011	6.09	0.0		
16.4	5	6.12	10.86	87.5	0.011	6.07	0.1		
19.7	6	5.85	10.90	87.1	0.011	6.06	0.0		
23.0	7	5.60	10.97	87.2	0.011	6.08	0.0		
26.2	8	5.55	10.96	87.0	0.010	6.04	0.0		
29.5	9	5.32	11.00	86.8	0.010	6.10	0.1		
32.8	10	5.26	11.02	86.9	0.010	6.11	0.1		
36.1	11	5.22	11.04	86.9	0.010	6.12	0.1		1
39.4	12	5.20	11.05	87.0	0.010	6.13	62.1		
42.7	13	5.18	11.05	86.9	0.010	6.16	0.1		
45.9	14	5,16	11.060	86.9	0.010	6.18	0.1		
49.2	15	5.09	11.06	86.8	0.010	6.19	0.1	-	
52.5	16	5.08	11.07	86.9	0.010	6.21	0.1		
55.8	17	5.08	11.06	86.8	0.010	6.26	0.1		
59.1	18	5.06	11.07	86.8	0.010	6.28	0.1		24
62.3	19	5.04	11.08	86.8	0.010	6.27	0.1		
65.6	20	5.04	11.07	86.7	0.010	6.20	0.1		
68.9	21	5.00	11.05	86.5	0.010	6.23	470.0		* Difference in
72.2	22				0.		()		death due to
75.5	23				Ch. B.				drift
78.7	24								
82.0	25		P.						
85.3	26								
88.6	27								
91.9	28		/						
95.1	29								
98.4	30								
101.7	31	-							
105.0	32								
108.3	33								
111.5	34								



(0)	SMUD In situ Monitoring in the Upper	Page _ [of _ [
Stillwater Sciences	American River Project and Chili Bar Project	Date: 4/26/16 Time: 12:00 PM
	Reservoir - Water Quality Vertical Profiles	1110. <u>12,00 FM</u>
		1 121 1 2-
	In	strument used: <u>YSI 6920</u>
Site Location:	UARP-R-IS-5-UVR	Water depth: 65 ft
Educing (In 1900).		Secchi (ft): 16 ft
Personnel: K	CC + BTH	Management of the second s
Site Notes: Pa_	rty cloudy, slight breeze, cool	

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	
surf	ace	10.74	10.40	93.7	0.011	6.32	0.1		
3.3	1	10.73	10.37	93.5	0.011	6,36	0.1		R1 #2 = 6.68
6.6	2	10.66	10.35	93.1	0.011	6.40	0.0		
9.8	3	10.31	10.35	92.2	0.010	6.51	0.1		
13.1	4	10.09	10.34	91.8	0.010	6.45	0.2		
16.4	5	9.90	10.38	91.8	0.010	6.41	0.1		PH #2 =6.13
19.7	6	9.20	10.66	92.7	0.010	6.49	0.1		
23.0	7	8.85	10.67	92.0	0.010	6.36	0.0		
26.2	8	8.60	10.74	91.9	0.010	6.31	0,0		
29.5	9	8.37	10.77	91.7	0.010	6.18	0.0		
32.8	10	8.19	10.81	91.7	0.010	6.08	0.0		PH #2 = 6.16
36.1	11	8.11	10.83	91.6	6.610	6.04	0.0		
39.4	12	7.99	10.83	91.4	0.009	6.02	0.1		· · · · ·
42.7	13	7.87	10.89	91.6	0.009	6.00	0.1		
45.9	14	7.70	10.84	90.8	0.009	5.94	0.0		
49.2	15	7.50	10,84	90.3	0.009	5.96	0,0		PH #2=5.94
52.5	16	6.99	16.85	89.3	0.009	5.99	0.0		
55.8	17	6.34	10.83	87.6	0.009	6.04	0.1		
59.1	18	6.04	10.81	86.8	0.009	5.95	0.1		
62.3	19	5.90	10.77	86.2	0.009	5,90	0,1		
65.6	20	5.86	10.77	86.2	0.009	5.88	0.1		
68.9	21	5.85	10.58	84.5	0.009	5.88	741,3		BOTTOM
72.2	22								
75.5	23								
78.7	24								
82.0	25					-			
85.3	26								
88.6	27		/						
91.9	28								11
95.1	29		1 -						
98.4	30		1						
101.7	31								
105.0	32								
108.3	33								
111.5	34								



Stillwater Sciences			SMUD In situ Monitoring in the Upper Page 1 of 2 American River Project and Chill Bar Project Date: 4/26/16 Reservoir - Water Quality Vertical Profiles Time: 10130 AM						26/16 130 AM
La	Site at/Long	e Location: g (NAD83):	UARP - R-IS-6-042#2 Instrument used: <u>4516920</u> Water depth: Secchi (ft):						
c	Person	nel D							
					alm				
_	_								
Depth		Temp	DO		Conductivity	pН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	
surf	ace	10.93	10.32	93.4	0.01	658	0.1		
3.3	1	10.42	10.54	94.2	0.01	6.65	0.1		PH#2 = 6.53
6.6	2	10.21	10,34	91.9	0.011	6.52	0,4		
9.8	3	10.03	10.33	91.5	110.0	6.51	0.3		
13.1	4	9.36	10.48		0.011	6.62	0.2		
16.4	5	8.85	10.61	91.5	0.010	6.53	0.2		PH #2 = 6.15
19.7	6	8 33	10.73	91.4	0,010	6.50	0.3		
23.0	7	8.20	10.74	91.5	0.010	6.33	0.2		
26.2	8	8.14	10.82	91.3	0.010	6.21	0.3		
29.5	9	8.05	10.76	90.9	0.010	6.12	0.2		
32.8	10	7.64	10.74		0.010	6.14	0.2	-	PH#2=6.23
36.1	11	7.26	10.67	88.4	0.010	6.17	0.1		
39.4	12 13	6.97	10.66		0.010	6.06	0.1		
42.7	13	6.77	10.64	87.2 B6.9	900.0	6.01	0.1		
45.9	14	6.69	10.63	Sances and	0.009	5.95	0.0	-	01 #2 - 1 15
49.2 52.5	16	6.47	10.62		0.009	5.92	0.0		PH#2= 6.17
55.8	17	6.35	10.63	86.1	0,009	5.86	0.0		
59.1	18	6.12	10.64	85.7	0.009	5,89	0.0		
62.3	19	6.04	10.61	85.3	0.009	5.88	0.1		
65.6	20	6.00		85.1	0.009	5.86	0.0		QH #2 = 6.08
68.9	21	5.93	10.59	84.8	0.010	5.86	0.1		
72.2	22	5.75	10.63		0.010	5.85	0.1		
75.5	23	5.57	10.58	84.0		5.81	0.0		
78.7	24	5.43	10.56	83.6	0.010	5.80	0.0		
82.0	25	5.40	10.52	83.2	0.010	5,79	0.0		PH++== 6.10
85.3	26	5.36	10.51	82.9	0.010	5.81	0.0		
88.6	27	5.27	10.49	82.7	0.010	5.82	0.0		
91.9	28	5.18	10.46	A CONTRACT OF STATE	0.010	5.84	0.0		
95.1	29	5.17	10.46		0.010	5.86	0.0		
98.4	30	5.15	10.47	B2.3	0.010	5.83	0.2		PH#2 = 6:18
101.7	31	5.10	10.41	81.7	0.010	5.78	0.1		
105.0	32	5.08	10.39	81.5	0.010	5.79	0.0		
108.3	33	5.06	10.38		0.010	5.81	0.1		
111.5	34	5.03	10.36	81.2	0.010	5.87	0.0		



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Stillwater Sciences

Reservoir - Water Quality Vertical Profiles

UARP-R-IS-6-0VR #2 4/26/16

Dep	oth	Temp	DO		Conductivity	рН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
	e uka			- Cost	(CON	TINUED)			
114.8	35	4.99	10.36	81.1	0,010	5.84	0.0		
118.1	36	4.96	10.34	80.9	0.010	5.85	0.0		
121.4	37	4.96	10.31	BOT	0.010	5.87	99B.1		BOTTOM
124.7	38								
128.0	39								
131.2	40					-			
134.5	41								
137.8	42								
141.1	43								
144.4	44								
147.6	45								
150.9	46								
154.2	47								
157.5	48								
160.8	49								
164.0	50								
167.3	51								
170.6	52								
173.9	53								
177.2	54								
180.4	55								
183.7	56								
187.0	57								
190.3	58								
193.6	59								
196.8	60								
200.1	61								



	ater Sci	ences	American Reserve	SMUD In situ Monitoring in the Upper Project American River Project and Chili Bar Project Date: 426116 Time: 12:45 PU Reservoir - Water Quality Vertical Profiles Instrument used: 4516920									
	Site	e Location:	UARP	-R-I	5-7-6	NR-	Wate	er depth:	165				
La	at/Long	g (NAD83):							- 0				
			CI BT	-il			Se	ecchi (ft):	19 ft				
			cc + BT										
Sit	le Note	ae. <	· · · · ·	and al	ight bree	20							
- Ch			muy. ce	101 - 51	Start Dies	- Charles - Char							
Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water Sample					
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)		Notes				
surf	ace	10.86	10.41	94.1	0.011	6157	0.3						
3.3	1	10.72	10.39	93.7	0.011	6.67	0.3		PH#2=6.73				
6.6	2	10.59	10.39	93.2	0.011	6.68	0.2						
9.8	3	10.46	10.38	92.7	0.010	6.72	0:3						
13.1	4	10.15	10.39	92.4	0.010	6.64	0.3						
16.4	5	10.05	10.43	92.5	0.010	6.56	0.1		PH#2 = 6.56				
19.7	6	9.66	10.46	91.9	0.010	6.65	0.1		A).				
23.0	7	9.50	10.52	92.1	01010	6.50	0.1						
26.2	8	9.16	10.58	91.9	0.010	6.49	0.1						
29.5	9	8.87	10.62	91.6	0.010	6.48	0.						
32.8	10	8.18	10.70	90.8	0.009	6.39	0.1		PH#2= 6.41				
36.1	11	7.63	10.78	96.2	0.009	6.25	0.0						
39.4	12	7.43		89.9	0.009	6.18	0,0	-					
42.7	13	7.12	10.82	89.4	0.009	6.16	0.0						
45.9	14	7.00	10.82		0.009	610	0.1						
49.2	15	6.90	10.83	88.9	0.009	6.07	0.0		PH#2=6.37				
52.5	17	6.73	10.83	88.6	0.009	6.04	0.0						
55.8 59.1	18	6.29	10.82	87.5	0.009	6.00	0,1						
62.3	19	6.25	10.80		0.009	6.01	0.0						
65.6	20	6.14	10.80	86.9	0.009	6,01	00		PH#2 = 6.03				
68.9	21	6.02	10.78	86.6	0.009	6.02	0.0						
72.2	22	5.83	10.77	86.2	0.009	6.03	0.0						
75.5	23	5.68	1075	85.7	0.009	6103	0.1						
78.7	24	5.63	10.77	85.7	0.009	6.04	6.1						
82.0	25	5.55		84.9	0.009	6.02	0.0	-	PH #2 = 5.96				
85.3	26	5.39		84.3	0.009	6.00	0.1						
88.6	27	5.33	10.63		0:009	5,99	0.1						
91.9	28 29	5.31	10.60	83.6	0.009	5.99	0.	-					
95.1	30	5:30	10.57	and the second se	0.009	6.00	0.0		DIL HO - 1 - 00				
98.4	31	5.30	10.56	83.3	0.009	6.01	0.0	-	PH#Z = 6.00				
1117 7	1 31	3 1 1	10.06	1 500 2 1	11 110-	01	621						

32

33

34

105.0

108.3

111.5

5.23

5.16

5.13

10.57 83.3

10.50 82.5

0.009

0.009

0.009

0.0

0.1

0.1

6.02

5.95

5.95



Page 2 of 2

Stillwater Sciences

Reservoir - Water Quality Vertical Profiles

14.8 118.1 121.4 124.7	(m) 35 36	(°C)	(mg/L)	(%)					Notes
118.1 121.4 124.7				(70)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
118.1 121.4 124.7					(CON	TINUED)			
121.4 124.7	36	5.09	10.44	81.9	0.009	5.96	0.1		PH #2 = 5.96
124.7	50	5.08	10.42	81.8	0.009	5,98	0.1		
	37	5.04	10.42	81.6	0.009	6.00	0.0		
	38	5.00	10.41	81.4	0.009	6.01	0.0		
128.0	39	4,95	10.41	81.4	0.010	6.02	0.0		
131.2	40	4.94	10.38	81.1	0.010	5.94	0,0		PH #2 = 5.94
134.5	41	4.90	10.36	80.8	0.010	5.89	0.1		
137.8	42	4.88	10.33	80.6	0.010	5.89	0.0		
141.1	43	4.88	10.31	80.5	0.009	5.88	0.0		
144.4	44	4.88	10,31	80.4	0.009	5.89	al		
147.6	45	4.84	10.28	80.1	0.010	5.93	0.1		
150.9	46	4.83	10.26	80.0	0.010	5,89	201.8		Bottom
154.2	47				0				
157.5	48				0.				
160.8	49								
164.0	50		-						
167.3	51								
170.6	52								
173.9	53								
177.2	54								
180.4	55								
183.7	56								
187.0	57								
190.3	58				_				
193.6	59								
196.8	60								
200.1	61								



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

Composition State Monitoring in the opperiod Stillwater Sciences American River Project and Chili Bar Project Date: 4/26/16 Time: 2:18 PH Reservoir - Water Quality Vertical Profiles Date: 4/26/16
Reservoir - Water Quality Vertical Profiles
Instrument used: YSI 6920
Site Location: UARR - R - IS - 8 Water depth: 113 ++
Lat/Long (NAD83): 105 072230-7 4305289-New
Point Secchi (ft): 18 44-

Personnel: KKC + BTH

cold, breezy

0

Site Notes: Cloudy,

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	[
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	10.38	10.52	95.0	0.011	6.47	0.2		
3.3	1	10.37	10.50	93.8	110.0	6.53	0.2		PH#2=6.82
6.6	2	10.33	10.50	93.6	0.011	6.50	0.2		
9.8	3	19.83	10.53	93.0	0.011	6.58	0.2		
13.1	4	9.78	10.54	92.8	0.011	6.41	0.2		
16.4	5	9.73	10.54	92.7	0.011	6.39	0.2		PH #2 = 6.70
19.7	6	9.65	10,53	92.5	0.011	6.41	0.2		
23.0	7	9.59	10.53	92.3	0.011	6.38	0.3		
26.2	8	9.53	10,49	91.8	0,010	6.44	0.2		
29.5	9	8.07	10.69	90.4	0.010	6.75	0.1		
32.8	10	7.84	10.70	90.0	0.010	6.41	0.1		PH #2 = 5,98
36.1	11	7.53	10.77	89.9	0.00	6.20	0.0		
39.4	12	7.48	10.77	89.8	0.010	6.05	0.0		
42.7	13	7.27	10.77	B9.3	0.010	6.02	0.1		
45.9	14	6.90	10.78	88.6	0.010	6.02	0.0		
49.2	15	6.82	10.77	88.3	0.010	5.97	0.1		PH #2=5,91
52.5	16	6.50	10.90	88.6	0.010	5.98	0.1		
55.8	17	6.35	10.75	87.1	0.010	5.92	0.0		
59.1	18	6.09	10.74	86.3	0.010	5.92	0.0		
62.3	19	5.93	10.72	85.8	0.010	5.90	0:0		
65.6	20	5.80	10.70	85.5	0.010	5.90	0.0	1	PH #2 = 5,99
68.9	21	5.74	10.69	85.2	0.010	5.90	0.0		
72.2	22	5.63	10,67	84.9	0.010	5.91	6.1		
75.5	23	5.56	10.67	84.7	0.00	5.92	0.1		
78.7	24	5.53	10.60	84.3	0.010	5.88	0.0		
82.0	25	5.51	10.62	84.2	0.010	5.86	0.0		PH #2= 5.96
85.3	26	5.46	10.60	84.0	0.010	5.89	0.0		
88.6	27	5.42	10.59	83.8	0.010	5.91	0.0		1
91.9	28	5.37	10.58	83.6	0.010	5,92	0.0		
95.1	29	5.33	10.58	83.5	0.010	5.94	0.1		
98.4	30	5.32	10.56	83.3	0.010	5.94	0.0		PH #2 =5.95
101.7	31	5.31	10.55	83.3	0.010	5.96	0.0		
105.0	32	5:30	10.53	83.1	0.010	5.90	0.1		
108.3	33	5.27	10.52	82.9	0.010	5.88	472.3		BOTTOM
111.5	34				0:1-				



	SMUD In situ Monitoring in the Upper	Page of				
Stillwater Sciences	American River Project and Chili Bar Project		27 (16 :00 Pm			
	Reservoir - Water Quality Vertical Profiles					
	In	nstrument used:	451 6920			
Site Location:	VARP-R-IS-14.5C	Water depth:	18.6 Ft			
		Secchi (ft):	14 ft			
Personnel: BT	+ KKC					

Site Notes: partly cloudy + windly + warm.

Dep	oth	Temp	D	D	Conductivity	pН	Turbidity	Water	Neter
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	7.90	11.98	100.9	0.023	5.45	0.6		
3.3	1	7,77	12.00	100.8	0.023	5.52	0.7		PH #2 = 5.74
6.6	2	7.78	11.95	100.3	0.023	5.57	0.7		0
9.8	3	7.81	11.97	100.4	0.023	5.57	0		
13.1	4	7.73	11.97	100,4	0.023	5.54	0.9		
16.4	5	7.70	11.98	100.4	0.023	5.55	0.7		PH#2 = 5.73
19.7	6	7.69	11.98	100.3	0.023	5.55	0.2		
23.0	7	7.66	11.99	100.3	0.023	5.58	0.1		
26.2	8	7.55	11.97	100.2	0.023	5.59	5.6		BOTTOM
29.5	9								
32.8	10					15			
36.1	11								
39.4	12								
42.7	13								
45.9	14								li i
49.2	15								
52.5	16								
55.8	17								
59.1	18								
62.3	19								-
65.6	20								
68.9	21								
72.2	22			· · · · · · · · · · · · · · · · · · ·					
75.5	23								
78.7	24		1						
82.0	25								
85.3	26								
88.6	27								
91.9	28							-	
95.1	29								
98.4	30			-					
101.7	31								
105.0	32								
108.3	33								
111.5	34								-



(SMUD In situ Monitoring in the Upper	Page of
Stillwater Sciences	American River Project and Chili Bar Project	Date: 4/27/16 Time: 1:10 P.H
	Reservoir - Water Quality Vertical Profiles	
Site Location:		Nater depth: 84 ft
Lat/Long (NAD83):		
		Secchi (ft): <u>[1 { }</u>
Personnel: B	TH+KEC	
Site Notes:	sunny, Col, windy	

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	10.30	11.45	102.2	0.021	6.08	0.8		
3.3	1	10.28	11.49	102.4	0.021	6.06	0.9		
6.6	2	16.25	11,48	102.3	0.021	6.01	0.9		
9.8	3	9.62	11.51	101.2	0.021	6.07	6.9		
13.1	4	10,27	11.47	100.9	0.021	6.10	6.9		
16.4	5	9.98	11.45	102.1	0.021	6.03	0.9		
19.7	6	8,98	11.53	101.0	0.021	5.98	1.1		
23.0	7	8.61	11.54	99.7	0.021	6.00	1.0		
26.2	8	8.50	11.53	1.101	0.021	5.95	1.1		
29.5	9	8.44	11.62	99,1	0.022	5.95	1.0		
32.8	10	8.37	11.64	99.1	0.022	5.82	1.0		
36.1	11	8.35	11.57	99.2	0:022	5.78	1.0		
39.4	12	8.29	11.68	99.4	0.022	5.77	ι. ι		
42.7	13	8.19	11.67	99.3	0.022	5,79	L		
45.9	14	8.16	11.65	98.8	0.021	5.85	1.0		
49.2	15	8.15	11.70	98.9	0.021	5.82	1.1		
52.5	16	8.12	11.70	99.3	0.021	5.78	1.0		
55.8	17	8.06	11.70	99.0	0.021	5,79	1.0	$\langle \rangle$	
59.1	18	8.05	11.71	99.0	6.020	5.77	1.1		
62.3	19	8.00	11.70	98.8	0.020	5.72	1.0		
65.6	20	8.00	11.70	98.8	0.020	5.76	1.1		
68.9	21	8.01	11.70	98.8	0.020	5.78	1.0		
72.2	22	8.00	11.69	98.8	0,020	5.83	1 . 1		
75.5	23	7.99	11.70	98.7	0.020	5.85	0.9		
78.7	24	7.98	11.68	98.7	0.020	5.83	6.9		
82.0	25	7.94	11.67	98.4	0.020	5.85	1.0		
85.3	26	7.93	11.67	98.4	0.020	5.85	1.0		
88.6	27	7.92	11.66	98.4	0.020	5.76	0.9		
91.9	28	7.91	11.65	97.9	0.020	5.86	1.0		
95.1	29	7.88	11.63	97.9	0.020	5.86	1.2		
98.4	30	7.83	11.60	97.5	0.021	5.86	1.3		
101.7	31	7.81	11.59	97.5	0.021	5.77	1.2		
105.0	32						~		
108.3	33								1
111.5	34								



Stillwater Sciences	SMUD <i>In situ</i> Monitoring in the Upper American River Project and Chili Bar Projec	Page of t Date:
	Reservoir - Water Quality Vertical Profiles	2.00101
		Instrument used: 451 6920
Site Location:	UARP-R-IS-13-CR	Water depth: 30 ft
Lat/Long (NAD83):		
		Secchi (ft): 255+
Personnel:	KC + BTH	
Site Notes:	cony, warm, Slight breeze.	

Dep	oth	Temp	D	0	Conductivity	pН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	ace	6.13	11.98	96.5	0.011	4.41	0.2		
3.3	1	6.12	12.02	96.8	0.0[]	4.29	0.1		PH#2=4.58
6.6	2	6.12	12.02	96.9	0.011	4.24	0,1		
9.8	3	6:10	12.03	96.9	0.011	4.27	0.0		
13.1	4	6.10	12.03	96.8	0,011	4.26	0.0		
16.4	5	6.06	12.03	96,8	0.011	4.28	0.0		PH#2 = 4,51
19.7	6	6.06	12.02	96.7	0.01	4.28	0.0		8
23.0	7	6.05	12.02	96.7	0.011	4.31	0.0		
26.2	8	6.05	12.02	96.7	0.011	4.33	0.0		
29.5	9	6.05	12.01	96,5	0.011	4.21	0.0		
32.8	10	6.06	12.01	96.6	0.011	4.26	424.7		BOTTOM
36.1	11					P			
39.4	12								
42.7	13								
45.9	14		10			2			
49.2	15								
52.5	16								
55.8	17								
59.1	18							1	
62.3	19								
65.6	20								N
68.9	21								
72.2	22								
75.5	23								
78.7	24								
82.0	25								
85.3	26								
88.6	27								
91.9	28								
95.1	29								
98.4	30								
101.7	31								
105.0	32								
108.3	33								
111.5	34								2



Stillwater Sciences	

SMUD In situ Monitoring in the **Upper American River Project and Chili Bar Project**

Page ____ of ____

Instrument(s) used:

Date:

Notes:

Crew: KKC+ BTH

Site Location: IS-5-6C GPS: 5/1/2016 Time: Photos:

451 6920

12:00 AN Weather: _____ (warm

				In situ			
Temp	DO		Conductivity	рН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)		
6.67	10.56	86.1	0.008	5.64	0.0		
			8				
					3		

Site L	ocation:	IS-6	0-6C		GPS:	
Date:		2016		1	Time:	12:45 PM
Photo	os:				Weather	SUNNY, WARD, Breezy
Notes	s:		3		2	3
			ň.			
- 201				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	ac Note:
6.92	10.62	86.1	0.008	5.17	- 0.2	Negative turbidity value recorded as "0.0".

Site L	ocation:	IS -9	- GCC		GPS:	
Date:	5/1	2016			Time:	LOOPM
Photo	(1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			Weather	SUDAY WARTA BREZY	
Notes						5
				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	
7.96	10.71	90.4	0.008	5.00	-0.3	OC Note: negative furbidity Value recorded as "0.0"
				-	Б.	
						1



page 2 of 7

Date: Photo Notes	_ <u>5/</u> 1	2016	7 - SFRR	GPS: Time: Weather:	105 0725404 4314865 1145 PM Sunny, Warm, Breezy	
				In situ		
Temp	D	0	Conductivity	pН	Turbidity	Natas
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	AcNote:
3.56	10.09	86.5	0.010	5.32	-0.2	Negative turbidity value recorded as "0,0"
						and the second sec
				1		

Site Location: IS- 8- SFRR	GPS:
Date: 5/1/2016	Time: 2:00 PM
Photos:	Weather: Thursterstormen, Warm
Notes:	<u> </u>

In situ											
Temp DO		C	Conductivity	pН	Turbidity	Notos					
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	QC Note:					
8.29	10.42	88.6	0.010	5.53	- 0.3	Negative turbidity value recorded as "0.0"					

Site L Date: Photo Notes	<u>5/2</u> os:	IS-12 /16	SFSC	GPS: Time: Weather	10:00AM SUDRY, Cool	
				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Natas
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
5.24	10.58	83.4	0.009	5.31	0.0	



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Stillwater	Sciences

SMUD In situ Monitoring in the **Upper American River Project and Chili Bar Project**

Page <u>3</u> of <u>7</u>

Instrument(s) used:

Crew: BTH + KKC

GPS:

Site Loca	ation	1:	IS - II - SESC	
Date:	5	2	16	
Photos:	1	1		2

451 6920

Time: 10:30 AM Weather: Sunny, Cool, Calm

In situ											
Temp	DO		Conductivity	pH	Turbidity	Neter					
(°C)	(mg/L)	(%)	(μS/cm)	(s.u.)	(NTU)	Notes					
6.75	10.91	89.4	0.013	5.48	0.3						

Site L	_ocation:	IS-I	2-5C	GPS:		
Date	5 2	2/16			Time:	10:45AM
Photo	os:		a	1	Weather	SUNNY, Cool
Notes	s:			0		2
						×
				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(μS/cm)	(s.u.)	(NTU)	Notes
5.88	11.11	89.1	0,011	5,55	0.0	

Site L	ocation:	IS-13	~5C		GPS:	
Date:	1	2/16			Time:	NIUSAM
Photo	os:				Weather	Partly clouder, Gool
Notes				M		2 2
-				In situ		-
Temp	D	0	Conductivity	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
8.55	10.87	93.0	0.015	5.63	0.5	



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Date: Photo Notes	os:	1	7-30		GPS: Time: Weather	12 15 PM Sunny, Warm
				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
101						
7.74	11.23	94.3	0.014	5.79	0.2	
		94.3	0.014	5.79		

Site Loca	ation: IS-17-E	C	GPS:
Date:	5/3/16	×	Time: 10:20 AM
Photos:			Weather: SUDAY, Cool, Calm
Notes:			

				In situ			
Temp	D	C	Conductivity	pН	Turbidity	Netes	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes	
10.07	10.35	91.9	0.024	5.12	20.1		

Site I Date: Photo Note:	5 3 os:		5-5AR	<u></u>	GPS: Time: Weather	Party condy, warm, calm
				In situ	21	
Temp	D	0	Conductivity	рН	Turbidity	Nataa
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
9.17	11.40	99.0	0.025	5.54	2.6	



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Stillwater	Sciences

SMUD In situ Monitoring in the Upper American River Project and **Chili Bar Project**

Page <u>5</u> of <u>7</u>

warm,

Instrument(s) used:

Crew: BTH+KKC

Site Loc	ation:	IS-16-SEAR	GPS:	
Date:	51	B/(6	Time:	11:15 AM
Photos:		1	Weather:	Partly cha
Notes:				Calm

451 6920

				In situ		
Temp (°C)	D((mg/L)	C (%)	Conductivity (µS/cm)	pH	Turbidity (NTU)	Notes
7.88	12.6	102.4		(s.u.) ธ.รน	(110)	
1						

Site L	ocation:	IS-19-	SFAR		GPS:	
Date:	5	3/16			Time:	12:00 PM
Photo	os:	,			Weather	Partly cloudy, warm,
Notes	S:					Slight Breeze
	-					0
				In situ		
Temp	D	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
8.93	11.37	98.2	0.022	5.95	1 - 1	

Site L	ocation:	I5-1	8-SFAR		GPS:	
Date:	5/3	16			Time:	1:00 PM
Photo	os:				Weather:	Partly Cloudy, Warm
Notes	5:		24			7
				In situ		
Temp	D	0	Conductivity	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
11.45	11.03	10(:2	0.029	6.02	0.6	



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Stillwater	Sciences

9.83

6.98

81.0

SMUD In situ Monitoring in the Upper American River Project and **Chili Bar Project**

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951 6920 Instrument(s) used: Crew: BTH + KKC

0.008

Site L	ocation:	IS-	4- GC.		GPS:	
Date:		116			Time:	12:30 PM
Photo Notes	-				Weather	Sonny, Verywindy
Notec						7
				In situ		
Temp	DC)	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes

7.12

1.4

Site	Location:		*		GPS:		
Date	:				Time:		
Phot	os:				Weather	:	
Note	s:						к.,
	-			In situ			
emp	DC)	Conductivity	рН	Turbidity	Notes	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1

Site L	ocation:	8			GPS:		
Date:					Time:		
Photo					Weather	:	
Notes	S:						
				In situ		2	
Temp	DC)	Conductivity	рН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes	
					5		



Stillwater Sciences

Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

SMUD	In situ Monitoring in the Upper	
American	River Project and Chili Bar Project	ct

Page_	of	
Date: _ Time:	5/17/16 0:30A1	1

Reservoir - Water Quality Vertical Profiles

Instrument used: <u>9516920</u> Water depth: <u>364</u>

Secchi (ft): ____9+++

Site Location: UARP - R-IS-4-60 Lat/Long (NAD83):

Personnel: KKC + BTH

Site Notes: Sunny, Coal, Windy

De	pth	Temp	D	0	Conductivity	pН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(μS/cm)	(s.u.)	(NTU)	Sample	Notes
surf	face	8.96	9.92		0.006	6.43	1.0		
3.3	1	8.95	9.87	85.3	0.006	6.31	1.1		
6.6	2	8.73	9.86	85.0	0.009	6.44	1.2		
9.8	3	8.64	9.88	84.7	0.006	6.56	1.2		
13.1	4	9.56	9.88	84.6	0.006	6.49	1.1		N
16.4	5	8.50	9.87	84.3	0.006	6.50	1.2		
19.7	6	8.49	9.86	84.3	0.006	6.58	1.2		
23.0	7	8.48	9.85	B4.2	0.006	6.59	1.2		
26.2	8	8.38	9.85	83.9	0.006	6.59	1.1	-	
29.5	9	8.36	9,84	83.8	0.007	6.63	2.8		BOTTOM
32.8	10								
36.1	11			-					
39.4	12				4				
42.7	13								
45.9	14								
49.2	15						7 K		
52.5	16								
55.8	17								
59.1	18								
62.3	19								
65.6	20								
68.9	21								
72.2	22								
75.5	23								
78.7	24			_					
82.0	25								
85.3	26	-							
88.6	27								
91.9	28								
95.1	29				1				
98.4	30						1		
101.7	31								2
105.0	32								
108.3	33								
111.5	34								



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Stillwater Scier	nces

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page / of <u>9</u>

Instrument(s) used:

Crew: BTH + KKC

Site Loc	ation: RubiconRes IS-I-RR
Date:	8/23/16
Photos:	
Notes:	

4516920

GPS: Time: <u>8:15 AM</u> Weather: <u>Sunny</u>, Cool

(mg/L) (%) (µS/cm) (s.u.) (NTU) NOT	Temp	DO		Conductivity	pH	Turbidity	Nation
1.22 2.2 1.25 1.22 2.0	(°C)	(mg/L)	(%)		(s.u.)	(NTU)	Notes
6.73 14.3 0.015 6.83 0.9	20.23	6.73	74.3	0.015	6.83	0.9	

		14	z - LRR		GPS:	
Date:	82	3/16			Time:	9:45AM
Photo	S:				Weather	Sunny, Warm
Notes	s:					2
				In situ		
Temp	D	0	Conductivity	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
18.01	6.27	66.2	0.013	6.85	1.2	
	· · · · ·		-			

ocation:	IS-3	3-LRR		GPS:	
				Time:	12:00 PM
os:	1			Weather	¥
3:					
			In situ		
D	0	Conductivity	pH	Turbidity	Netes
(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	-Notes
6.90	78.2	0.009	6.56	1.6	
		1			
	S/2 ∷ 	<u>8 23/16</u> s: DO (mg/L) (%)	DO Conductivity (mg/L) (%) (μS/cm)	B 23/16</th DS: In situ DO Conductivity pH (mg/L) (%) (µS/cm) (s.u.)	B Z Time: ws:



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Stillwater S	Sciences

SMUD In situ Monitoring in the **Upper American River Project and Chili Bar Project**

Instrument(s) used: 451 6920

Crew: Kkc + BTH

ite Location: IS-5-GC	GPS:
Date: 8/23/16	Time: 14:47
Photos:	Weather: Summa merm
Notes:	

Temp	DO		Conductivity	pH	Turbidity	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
18.47	7.99	85 Z	0.010 (8)	6.76	1. 6	
	-					

Site I	Location:	IS.	-6 - GC		GPS:	
Date:	8/23	1,6			Time:	15:11
Photo Notes					Weather	Sunny, warm
		-		In situ	and the second	
Temp	C	0	Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
15.60	8.22	82.7	0.011 (9)	6.50	16	
		177 C				
			-			

Date Phot Note	:os:	3/16	1- 62		GPS: Time: Weather:	15:42 Strag, Verm
	-			In situ		
Temp (°C)	[(mg/L))O (%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	Notes
1.54	8.52	78.4	0.008 (4)	6.40	1.4	
11.54	8.52	-18-4	0.008 (4)	6.40	(, 4	





SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used:

839

18.28

89.2

Chili Bar Proiect

Crew: KRC + 3TH

Site I	ocation:	Is -	9- GCC		GPS:	
Date:	8/2	3116			Time:	16:08
Photo					Weather	Stron norm
Notes	3:					
				In situ		
Temp	DC)	Conductivity	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(uS/cm)	(s.u.)	(NTU)	INOLES

6.81

1. 40

Date:	6	123/16			Time:	16.22
Photo Notes	100 C				Weather	Svang, werm
	9 			In situ		
emp	D	0	Conductivity	pH	Turbidity	Notos
ſemp (°C)	D (mg/L)	O (%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	- Notes

Date: Photo Note:	os:	-3 NO			Time: Weather	16:31 Sunny, werm
				In situ		
Temp	D	0	Conductivity	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	110103
8.19	8.11	83.0	0.009	6.94	1.6	
	-					



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Stillwater Sciences

SMUD In situ Monitoring in the **Upper American River Project and Chili Bar Project**

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Instrument(s) used:

451 6920

Crew: KKC+BTH

Site L Date: Photo Notes	05: <u>8/21</u>		9 - SFAR		GPS: Time: Weather	9:05AM Sunny, Cool
				In situ		
Temp (°C)	D (mg/L)	O (%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	Notes
12.52	9.97	93.7	0.016	6.07	0.2	

Site L	_ocation:	15-1	8-SFAR		GPS:	
Date:	8/21	1/16			Time:	10:00 AH
Photo	os:	·			Weather	Sunny, Cool
Notes	s:					0
				In aitu	_	
Temp	De De	0	Conductivity	In situ pH	Turbidity	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
15.73	9.45	95.2	0.026	6.46	0.8	

::				Time: Weather:	-11:19 Sunny, hot
1			In situ		
		Conductivity	рН	Turbidity	Notes
(mg/L)	(%)	(µS/cm)	(s.u.)	(NIU)	
10.21	100.7	0.018	6.65	0.0	
	8				
	(mg/L)		(mg/L) (%) (μS/cm)	DO Conductivity pH (mg/L) (%) (μS/cm) (s.u.)	DO Conductivity pH Turbidity (mg/L) (%) (μS/cm) (s.u.) (NTU)



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Stillwater Sciences	

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

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Instrument(s) used:

451 6920

Crew: BTH + KKC

Site Location: IS - 10 - SFSC	GPS:
Date: 3/25/16	Time: 14:36
Photos:	Weather: SLAR werm
Notes:	

Temp	DO		Conductivity	pH	Turbidity	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
7.36	9.86	81.8	0.012	6.41	1. 4	

Site I	Location:			GPS:	GPS:		
Date:				Time:			
Photo	os:				Weather		
Notes	s:						
				In situ			
Temp	DC)	Conductivity	pH	Turbidity	Netes	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes	
			1				
			-				
	1		-				

Site I Date Phote Note	os:		GPS: Time: Weather:					
	-			In situ				
Temp	DO		Conductivity	pH	Turbidity	Notes		
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes		
	-							



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Stillwater	Sciences

SMUD In situ Monitoring in the **Upper American River Project and Chili Bar Project**

Page <u>7</u> of <u>9</u>

Instrument(s) used:

451 6920

Crew: Kkc + BTH

Site I	ocation:	IS-	11-SESC.	GPS:				
Date:				Time:	10:20 AM			
Photo	os:	1			Weather: Sunny, Warm			
Notes	3:					3:		
	-			-				
				In situ				
Temp	DC)	Conductivity	pН	Turbidity	Notes		
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	INOTES		

2.59	1122	u l'e	0.016	0.12	1	
	1 2 0			1 - 1		
			1		·	

Site L	ocation:	IS-12	2 - SC	GPS:		
Date: <u>8/26/16</u> Photos: Notes:					Time: Weather	Sunny, Warm
				In situ		
Temp (°C)	D (mg/L)	O (%)	Conductivity (µS/cm)	pH (s.u.)	Turbidity (NTU)	Notes
9,15	9.63	83.6	0.014	6.42	0.6	

Date Phote Note	os:			_	Time: Weather	Time: <u>ILISOAM</u> Weather: <u>Soung</u> , Wash	
	V			In situ	-	A	
Temp	DO		Conductivity	pН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Hoteo	
10.99	10.23	92.7	0.020/12	6.70	0.6		





SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page 8 of 9

Instrument(s) used:

451 6920 Crew: KKC + BTH

Site Location: IS-13-5C	GPS:
Date: 8/26/16	Time: 12:25 PM
Photos:	Weather: SUNDY, WARM
Notes:	0

			1.11.1.1.1.1.1	In situ		
Temp	DO		Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	
15.11	8.95	90.8	0.018/14	6.85	0.7	1
			1			
			1		1	

Site L Date: Photo Notes	os:	IS-16 6/16	-SFAR		GPS: Time: Weather	_1:45 PH
				In situ		
Temp (°C)	D (mg/L)	O (%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	– Notes
12.09	10,47	97.4	0.019(14)	6.66	0.7	

Site I Date: Photo Note:	os:		5-SFAR		GPS: Time: Weather	14:01 Sonny, hot, windy
				In situ		
Temp	DO		Conductivity	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
19.02	8.97	96.8	0052	7.12	12	
		1				



(CCC)	
Stillwater Stillwater	Sciences

SMUD In situ Monitoring in the Upper American River Project and **Chili Bar Proiect**

Page 9 of 9

451 6920

Instrument(s) used:

Crew: KKC + BTH

ite Location: IS - 17 - BC	GPS:
Date: 26/16	Time: 2:40 PM
Photos:	Weather: Sunny, warm
Notes:	

				In situ		
Temp (°C)	D((mg/L)	0 (%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	Notes
18.77	8,40	90.3	0.032	7.3[3.42	

Date Phote	os:				GPS: Time: Weather	
Note	s:			In situ	Turbidity	
Temp (°C)	(mg/L)	(%)	Conductivity (µS/cm)	рН (s.u.)	Turbidity (NTU)	- Notes

Site I	Location:				GPS:	
Date	:				Time:	
Photo	os:				Weather	
Notes	s:					
	A.	-		In situ		
Temp	DC)	Conductivity	pH	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(s.u.)	(NTU)	Notes
	11 11 1					
	1					



	SMUD In situ Monitoring in the Upper American River	Page of
Stillwater Sciences	Project and Chili Bar Project	Date: 10/24/16
	Reservoir - Water Quality Vertical Profiles	Time: _2:20 PM
Site Location: Lat/Long (NAD83):	R-IS-13-CR	Water depth: 19.5
Personnel:	KC + BTH	Secchi (ft): 16 ft
Site Notes:	loudy, Cool, Slight Breeze	

(ft) surfa	(m)	(°C)			Conductivity	Conductance	pН	Turbidity	Water	Notes
		(0)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
and the second	ice	11.00	10.49	95.1	13.0	0.017	6.63	0.7		
3.3	1	11.00	10.48	95.1	13.0	6.017	6.57	0.7		
6.6	2	11.00	10.48	95.1	13.0	0.017	6.55	0.7		
9.8	3	11.00	10,4B	95.0	13.0	0.017	6.53	0.7		
13.1	4	10.99	10,48	95.0	12.0	0.017	6.57	0.6		
16.4	5	10.99	10.47	94.9	12.0	0.017	6.49	0.7		Battan
19.7	6	10.99	10.46	94.9	12.0	0.017	6.47	0.7		BOTTOM
23.0	7	2								
26.2	8									
29.5	9									
32.8	10									
36.1	11									
39.4	12			2						
42.7	13		-							
45.9	14									
49.2	15				÷					
52.5	16									
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
	24									
02.0	25 26									
00.0	26									
00.0	27									
01.0	28									
	30									
00.1	31						-			
	31									
100.0	33									
	34					-				



SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project

Reservoir - Water Quality Vertical Profiles

R-IS-14-5C

Page <u>2</u> of <u>5</u>

Date: 10/24/16 Time: 11:10 A.M.

Secchi (ft): 994

((1))

Stillwater Sciences

Instrument used: <u>6920</u> Water depth: <u>17,7</u>

Site Location: ______ Lat/Long (NAD83): ____

Personnel: BTH +KKC

Site Notes: <u>Cloudy</u>, Cool, Slight breeze

De	pth	Temp	D	0	Conductivity	Specific	рН	Turbidity		
						Conductance			Water Sample	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Jampie	
sur	face	11.1	10.30	93.6	18.0	0.025	7.18	1.9		
3.3	1	11.06	10.80	98.1	18.0	0.025	6.90	2.3		
6.6	2	11.05	10.80	98.4	18.0	0.025	6.87	2.5		
9.8	3	11.05	10.80	98.5	18.0	0.025	6.84	2.3		
13.1	4	11.04	10.85	98.4	18.0	0.025	6.78	2.4		
16.4	5	11.03	10.83	98.2	19,0	0,026	6.70	3.4		
19.7	6									
23.0	7									
26.2	8									
29.5	9									
32.8	10									
36.1	11									
39.4	12									
42.7	13						1			
45.9	14			1						
49.2	15									
52.5	16				-					
55.8	17									
59.1	18									
62.3	19									
65.6	20									
68.9	21									
72.2	22									
75.5	23									
78.7	24									
82.0	25		0							
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30									
101.7	31									
105.0	32									
108.3	33									
111.5	34									



(Cear)	SMUD In situ Monitoring in the Upper American River	Page <u>3</u> of <u>5</u>
Stillwater Sciences	Project and Chili Bar Project	Date: 10/24/16 Time: 11:456M
	Reservoir - Water Quality Vertical Profiles	
Site Location: Lat/Long (NAD83):	R-IS-15-SC	Water depth: 113 ft
	TH + KEC	Secchi (ft):
Site Notes:	outy, Cool, Slight breaze	

Dep	oth	Temp	D	0	Conductivity	Specific Conductance	рН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
surf	ace	12.74	9,98	94.1	22.0	0.028	6.81	4.7		
3.3	1	12.62	9.88	92.9	21,0	0.028	6.81	5.0		
6.6	2	12.37	9.81	91.6	21.0	0.028	6.80	5.1		
9.8	3	12.19	9.70	90.3	21.0	0.028	6.79	5.5		
13.1	4	12.08	9.61	89.2	21.0	0.028	6.77	5.7		
16.4	5	11.99	9.55	88.6	21.0	0.028	6.77	5.9		
19.7	6	11.95	9.57	88.1	21.0	0.028	6.77	6.1		
23.0	7	11.91	9.49	87.8	21.0	0.028	6.76	6.3		
26.2	8	11.70	9.53	87.9	21.0	0.028	6.77	9.5		
29.5	9	11.56	9.64	88.5	21.0	0.028	6-74	9.7		1.7
32.8	10	11.50	9.95	91.5	19.0	0.026	6.72	12.2		
36.1	11	11.47	10.08	92.5	19.0	0.026	6.74	11.6		
39.4	12	11.44	10.13	92.8	19.0	0.026	674	9,3		-
42.7	13	11.32	10.24	93.6	19.0	0.026	6.74	7.4		
45.9	14	11.32	10.28	94.0	19.0	0.026	6.73	7.3		
49.2	15	11.2B	10.30	94.1	18.0	0.025	6.70	7.8		
52.5	16	11.26	10.32	94.2	19.0	0.025	6.65	7,2		
55.8	17	11.24	10.33	94.2	18.0	0.025	6.62	7.6		9 1
59.1	18	11.23	10.32	94.1	18.0	0.024	6.58	7.6		
62.3	19	11.19	10.32	94.0	18.0	0.024	6.56	7.3		
65.6	20	11.17	10.32	93.9	19.0	0.025	6.54	7.3		
68.9	21	11.16	10.29	93.7	18.0	0.024	6.53	6.2		
72.2	22	11.13	10.28	93.5	18.0	0.024	6.53	6.0		ιά.
75.5	23	11.11	10.2B	93,4	18.0	0.024	6.53	5.9		2
78.7	24	11.10	10.27	93.4	18.0	0.024	6.53	5.4		
82.0	25	11.08	10.26	93.2	18.0	0.024	6.53	5.3		
85.3	26	11.06	10.23	92.9	18.0	0.025	6.54	4.9		
88.6	27	11.06	10.19	92.5	18.0	0.025	6.54	4.6		
91.9	28	11.04	10.18	92.4	18:0	0.025	6.55	4.8		
95.1	29	11.03	10.17	92.2	18.0	0.024	6.55	4.7		1
98.4	30	11.00	10.16	92.1	18.0	0.027	6.56	4.3		
101.7	31	10.96	10.17	92.2	19.0	0.026	6.56	4.3		
105.0	32	10.91	9.99	90.2	18.0	0.025	6.55	4.8		
108.3	33	10.91	9.66	86.8	20.0	0.027	6.52	129.9		BOTTOM
111.5	34					0.				



27,6 Ft

SMUD In situ Monitoring in the Upper American River (0) Project and Chili Bar Project Stillwater Sciences **Reservoir - Water Quality Vertical Profiles**

Page	_/_ of _/_
Date: Time:	10/25/2016
Instrument us	ed: 152 6920

Water depth:

Secchi (ft): ____4

Site Location: R-IS-S-UVR Lat/Long (NAD83): BCR BTH

Personnel:

Site Notes:

De	-	Temp	D	0	Conductivity	Specific Conductance	pН	Turbidity	Water Sample	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
sur		14.56	8,89	87.4	14	0.016	6,22	1.8		
3.3	1	14.56	8.39	\$2.3	12	0,015	6.64	1.4	-	
6.6	2	14,50	8,38	82.3	12	0.015	6.64	1,4		
9.8	3	14,38	8,40	62,2	14	0,018	6.67	1.4	1 - 1	
13.1	4	14,29	8,43	82.3	12	0.015	6.66	1,4		
16.4	5	14.27	8,44	82,3 82,3	12	0.015	6.67	1,4		
19.7	6	14,23	8.43	82,3	-12	Dials	6.70	1.5	1	
23.0	7	14.19	8.43	\$2.2	12	0.015	6,69	1,4		
26.2	8	13.71	8,46	81,4	13	Q-016	6.67	4.3		Bottom
29.5	9									
32.8	10		1.1	1						
36.1	11								-	
39.4	12				· · · · · · · · · · · · · · · · · · ·					
42.7	13					1				
45.9	14							1		
49.2	15	-								
52.5	16			1						
55.8	17									
59.1	18							1		
62.3	19					_				
65.6	20				<			·		
68.9	21									
72.2	22			-						
75.5	23								-	
78.7	24					1			_	
82.0	25									
85.3	26									
88.6	27							1. 1.		
91.9	28								-	
95.1	29						- V			
98.4	30			1.1.1						
101.7	31									
105.0	32									
108.3	33						1			
111.5	34			1.1.1.1						



34	ir - Water Quality Ve	ertical Profiles	Tir	ne: 09-	8/25/2016 12-1000 YST 6920
Site Location Lat/Long (NAD83 Personnel: <u></u>	 6 - uvr		Wate	r depth: cchi (ft):	86 44
Site Notes:					

De	pui	Temp	D	5	Conductivity	Conductance	рн	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
sur	face	14,61	8,70	84.5	14	0.017	6.99	1.3	1. 2	
3.3	1	14.65	8.17	80,4	13	0.016	6.34	1.2	-	
6.6	2	14.65	8.16	80,3	13	0.016	6,20	1.3	10.00	t
9.8	3	14,64	8.13	80.0	13	0.016	6.08	1.3		
13.1	4	14.64	8.13	80,0	14	0,017	6,00	1.3		
16.4	5	14,64	8.09	79.6	12	0.015	5.97	1.3		
19.7	6	14,65	8,09	79.6	12	0,015	5,97	1.3		
23.0	7	14.64	8,09	79.6	12	0,015	5.97	1.3		
26.2	8	14,64	8.07	79,4	12	0.015	5,98	1.3		
29.5	9	14,64	8,05	79,2	12	0.015	5.99	1.3		
32.8	10	14,64	8.04	79.1	12	0.015	6.00	1.3		
6.1	11	14.64	8.03	79.0	12	0.015	6,02	1.3		
9.4	12	14,64	8,03	79.0	12	0,015	6.03	1.3		
2.7	13	14,64	8.03	79,0	13	0.017	6.06	1.3		
5.9	14	14,64	8,03	79,0	12	0.015	6.07	1.3	-	
9.2	15	14,64	8.02	78,9	12	0,015	6.08	1,3		
2.5	16	14.64	8.02	78,9	12	0.015	6.09	1.3	_	
5.8	17	14,64	8,00	78.8	12	0.015	6,11	1.4		
9.1	18	14,64	8.01	78,8	12	9.015	6,12	1,3		
2.3	19	14,63	7,99	78,7	12	0.015	6.14	1,3		
5.6	20	14,62	7,98	78.4	12	0,015	6.15	1.3		
8.9	21	14,59	7,91	77.7	12	0.015	6.16	1.3		
2.2	22	14.46	7,85	76.7	12	0,018	6.17	1.4		
5.5	23	14,10	7,92	77.0	14	0.017	6,18	1.4		
8.7	24	13.87	7.64	73.9	12	0.015	6.14	1.4	122	
2.0	25	13.83	7,61	73.3	12	0.016	6.10	1.4		
5.3	26	13.79	7.51	72,3	12	0,016	6,10	3,4		Battom
8.6	27				-					
1.9	28									
5.1	29					1				
8.4	30			1		1				
01.7	31				-					
05.0	32	1	1	1.1.1.1.1						
08.3	33			1						*
11.5	34						1			

-



SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project

Page / of / Date: 10/25/2016Time: 1/25 - 1/43

Reservoir - Water Quality Vertical Profiles

Stillwater Sciences

BTH

Instrument used: YSJ 6920 Water depth: 95 FF Secchi (ft): __[3

Site Location: <u>R ~ I S ~ 7- UV R</u> Lat/Long (NAD83):_____

Personnel: BCR

Site Notes:

De	pth	Temp	D	0	Conductivity	Specific Conductance	рН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
sur	face	14.73	8,89	67,7	13	0,016	6.59	1.2		
3.3	1	14,73	8.33	82.1	13	0,016	6,71	1.3		
6.6	2	14,73	8,28	81,6	Z	0.015	6.73	1,3	_	
9.8	3	14.70	8.24	81.2	12	0,015	6.75	1.4		
13.1	4	14,69	8,22	81,0	12	0,015	6.75	1.4		
16.4	5	14,69	8,21	8019	12	0,015	6,74	1,4		
19.7	6	14.68	8.20	80.7	12	0,015	6,73	1.4		8
23.0	7	14,68	8,19	80,7	12	0,015	6,73	1.3		
26.2	8	14.68	8,17	80,5	12	0,015	6,73	1.4		
29.5	9	14.68	8.17	80,4	12	9,014	6.72	1.4		
32.8	10	14,68	8,16	80.4	12	0,014	6.71	1.3		
36.1	11	14.68	8,16	80,3	13	0.015	6,72	1.3		
39.4	12	14.67	8.15	80.2	11	0.014	6.72	1.3		
42.7	13	14.66	8.15	80,2	12	0.014	6,70	1.3		
45.9	14	14.66	8.14	80.1	11	0.014	6.71	1.4		
49.2	15	14.66	\$,13	80.1	11	0,014	6.70	1.4		
52.5	16	14.65	8.13	80,0	12	0.014	6.71	1.4		
55.8	17	14.65	8.12	79,9	1/	0.014	6.71	1,4		
59.1	18	14,65	8.81	79,8	11	0.014	6,71	1.4		
62.3	19	14.64	8.10	79.7	11	0.014	6.72	1.4	•	81
65.6	20	14.60	8,09	79,6	12	0.014	6.69	1.4		
68.9	21	14,56	8.08	79.2	12	0.015	6.70	1.4		
72.2	22	14,37	809	79,1	14	0,017	6.69	1.4		
75.5	23	14.16	7,97	77.5	12	0.015	6.68	1.4		
78.7	24	14.07	7,93	77.0	12	0-015	6.68	1.5		
82.0	25	13.98	7,89	76.5	12	0.015	6,66	1.5		
85.3	26	13.84	7.87	75.8	12	0.015	6.64	1.5		
88.6	27	13.58	7,81	74.9	11	0,015	6,63	1.6		
91.9	28	13.48	7,73	74,1	12	0,015	6,61	1.5		
95.1	29	13,39	7.67	73,3	12	0.015	6.60	1.5		
98.4	30	13,26	7.56	72.2	12	0.0 15	6.55	1.6		
101.7	31	13.17	7,54	71.8	14	0,018	6.56	1.6		
105.0	32	12,99	6.23	58,7	40	0.052	6,18	12,3		Battam
108.3	33									
111.5	34									



CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	SMUD <i>In situ</i> Monitoring in the Upper Project and Chili Bar Pro	
Site Location Lat/Long (NAD83)		
Personnel: <u>B(</u> Site Notes:	BTH Steander death read	Secchi (ft): <u>16</u>

(ft) surfa 3.3 6.6 9.8 13.1	1 2 3	(°C) 14,64 14,64	(mg/L) 8,65	(%)	(µS/cm)					Notes
3.3 6.6 9.8 13.1	1 2 3	14.64			(µ3/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
6.6 9.8 13.1	2 3			85.1	14	0,017	6.38	1,3		
9.8 13.1	3	1	8.65	88.1	13	0.016	6,55	1.3		
13.1		14.64	9.13	79,9	13	0,016	6.59	1.4		
	1.51	14.61	8,06	79.2	13	0,016	6.60	1.3		
10.1	4	14.60	8,03	78.9	13	0,016	6.56	1.4		
16.4	5	14,59	8.00	78.6	54	0.015	6.58	1.3		
19.7	6	14.59	7,97	78.3	12	0,015	6,60	.1.3		
23.0	7	4.54	7.94	78.0	12	0.015	6.5 8	1.3	1	
26.2	8	14.58	7.93	77.9	12	0.015	6.60	1.3		
29.5	9	14,58	7.91	77.8	12	0.015	6.60	1.4		
32.8	10	14.58	7,91	77.7	12	0.015	6.61	1.3		
36.1	11	14,58	7.91	77.6	12	0.07	6,61	1.3		
39,4	12	14,58	7,90	77.6	13	0.016	6.59	1:3		
42.7	13	14.58	7,88	77.4	12	0.014	6.58	1.3	_	
45.9	14	14, 58	7,88	77.4	11	0.014	6.58	1.3		
49.2	15	14.58	7,91	77.7	1	0.014	6,60	1.3		
52.5	16	14.57	7,92	77.9	/	0,014	6.60	1.4		
55.8	17	14,57	7.93	77.9	11	0.014	6,60	1.4		
59.1	18	14.57	7,92	11.1	Ų	0.014	6.60	1.4		-
62.3	19	14.57	7.90	77.6		0.014	6.60	14		
65.6	20	14.57	7.86	77.2		0.014	6.61	1.4	(
68.9	21	14.56	7.44	77.0		0.014	6.61	1.3	-	
72.2	22	14.54	7.82	76.7		0.014	6,61	1.3		
75.5	23	14.52	1.11	76.1	13	004	6.60	1.2		
78.7	24 25		1.11	75,4	13	0.016	6.60	1 /1	-	
82.0	25	19.97	7.16	75.6	-12-	0.016	1 - 0	1.2		
85.3	20	13.91	6.93			Q100 11	1	1.2	-	
88.6	27	1000	6.81	56.9			7		-	
91.9	28	13,75	1 75		12	0.014	6,49	1 1		
95.1	30	13,33	6.69	64.7	12	0,016	6.44	1.2		
98.4	31	13, 16	110	121	12	0.014	6.43	1.1	1	
101.7	32	13.13	6.68	63.5	1	0.014	1 24	1.2		
105.0	33	13.03	6.64	63.5	1	0.014	6,39	1.2		
108.3 111.5	34	12,98	6.66	63.1	11	0.214	6.35	12	1	



Stillwater Sciences

Page 2 of 2

Reservoir - Water Quality Vertical Profiles

R-IS-G-UVR

De	pth	Temp	D	0	Conductivity	-	pН	Turbidity	Water	
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)		(s.u.)	(NTU)	Sample	Notes
						(CONTINUE	D)			
114.8	35	12.76	6.57	62.0	12	0.016	6.34	1.1		
118.1	36	12.67	6.491	61,1	11	0.014	6.33	1.1	1. Carlos	
121.4	37	12.58	6,48	60.8	11	0.014	6.28	10		the second second
124.7	38	12,48	6,52	61.4	11	0.014	6.26	11	-	
128.0	39	12,49	6.69	62.7	11	0.014	6.22	1.2		
131.2	40	12.38	6.66	62.1	11	0.014	6,20	1.0		
134.5	41	12,22	(m/	61.1	10	0,014	6.16	1.0		
	42	12.19	6.56	60.6	10	0,014	6.11	1.0	-	
137.8	43	12.06	6,45	59.8	10	0,014	6.05	1.0		
141.1	44	11.94	6	\$9,4	10	0.014	1 01	1.0		
144.4	44	11.94	6.41	59.5	12	0.019	6.01	1.0		
150.9	46	1.86	6.44	59.5	12	0.016	5.95	1.0		1
154.2	47	11.73	6,42	59.1	10	0,014	5.94	0.9		1
157.5	48	11.64	6,37	58.6	10	0.014	5.95	1,0'		E C
160.8	49	11.61	6.34	58.2	10	0.014	5,95	1,0		
164.0	50	11.54	6.30	57.8	11	0.015	5.96	1.0		
167.3	51	11.45	6.27	\$7.4	1/	0.0 14	5.96	1.0		
170.6	52	11.36	6.24	57.0	1/	8.0 14	5.96	0,9		
173.9	53	11.33	6.14	56.0	10	0.014	5.96	0,9		
177.2	54	11,04	5,89	53,3	11	Q1015	5.87	1830		Battem
180.4	55					0.0	S.			
183.7	56			1.1.1.1.1	1	0.0	S.			
187.0	57	0				0,0				
190.3	58					0.0				
193.6	59					0.0			· · · · · · · · · · · · · · · · · · ·	
196.8	60			1.00		0.0				
200.1	61		11	1		0.0	· · · · · · · · · · · · · · · · · · ·			
	62	1 - I	1	P		Q.Q				
	63				· · · · · · · · · · · · · · · · · · ·	0.0				
-	64					0.0				
-	65					0.0				
-	66				-	0.0				
-	67			-		0.0				
1	68					0.0				
	69				terror terror in	Q.Q			1	-



Stillwater Sciences	SMUD In situ Monitoring in th Project and Chili		Date: _10/26/2016
Site Location:	Reservoir - Water Quali	ty Vertical Profiles	Time: $1020 - 10^{8S}$ Instrument used: $751 - 6920$ Water depth: $71 - 64$
Lat/Long (NAD83):			Secchi (ft): 17
Personnel: <u>BC</u> Site Notes: <u>W</u> . ⁽⁴⁾	R BTH ndy lots of	drift	

Depth		Temp	DO		Conductivity	Specific Conductance	pH	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	littes
sur	lace	19.55	8.81	79,0	10	0,014	4,78	1.8		
3.3	1	19.55	8.71	78.1	9	0.013	481	1.8		
6.6	2	10.55	8.70	78.0	9	0012	5,04	1.8		
9.8	3	10,54	8.69	7719	8	0,011	5,16	1,9		
13.1	4	10.54	8.68	77.8	q	0.011	5.23	1,8		
16.4	5	10.54	8.67	77.4	8	0.011	5.33	1.9		
19.7	6	10.54	8,66	77,7	8	0.011	5.43	1.9		
23.0	7	10.53	8.65	77.6	g	0.011	5.55	1,9		
26.2	8	19.54	8,65	776	10	0.013	5.63	1.9		
29.5	9	10.52	8,69	7717	7	0,009	6.32	1.9		
32.8	10	10.51	6163	77.4	7	0.012	6.36	1.9		
36.1	11	10,51	8.63	77.3	7	0.004	6.35	2:1		
39.4	12	10.52	8,6Z	77.3	7	8,009	6.39	1.9		
42.7	13	10.51	8.61	77.2	6	0.009	6.41	1.9		
45.9	14	10.51	6.60	77.1	7	0.009	6.42	2,4		
49.2	15	10.48	8.59	77:0	7	0.009	6.46	1.9		
52.5	16	19.46	8.54	77.0	7	0.009	6.44	1.9	1	
55.8	17	10.43	8.57	76.7	6	0.099	6,48	1,01	1	
59.1	18	10.28	652	76:0	6	0,009	6,47	1,0	1	
62.3	19	10.17	8.54	75.6	6	0.008	6,48	211		
65.6	20	10.06	8.33	74,4	6	0.009	6.41	2.0	1	
68.9	21	193	8,26	72.8	7	0.009	6.37	2.1	1	
72.2	22	9.75	8,04	70,8	6	0.009	6.26	2.3		
75.5	23	9,74	7.95	TOID	6	0,009	6.13	2.7		
78.7	24	9,69	7.73	67.8	22	0:031	5,91	66,0		Bettom
82.0	25	4.						to be		
85.3	26									
88.6	27									
91.9	28									
95.1	29								S	1
98.4	30				1					
101.7	31			_	1					
105.0	32								1	
108.3	33							1		
111.5	34						1			

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SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project Page 1 of 2

Secchi (ft): 12

Reservoir - Water Quality Vertical Profiles

Stillwater Sciences

Date: 10/26/16 Time: 11:26-11:50

Site Location: <u>K-IS-2-LL</u> Lat/Long (NAD83):

Long (NAD00).

Personnel: BCR BTH

Site Notes:

Depth

surface

1

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13

14

15

16

17

18

19

20

21

22

23

24

25

26

88.6 27

28

29

30

31

32

33

34

(ft) (m)

3.3

6.6

9.8

13.1

16.4

19.7

23.0

26.2

29.5

32.8

36.1

39.4

42.7

45.9

49.2

52.5

55.8

59.1

62.3

65.6

68.9

72.2

75.5

78.7

82.0

85.3

91.9

95.1

98.4

101.7

105.0

108.3

Specific Temp DO Conductivity pН Turbidity Conductance Water Notes Sample (°C) (mg/L) (%) (µS/cm) (mS/cm) (s.u.) (NTU) 8.98 10.72 80.9 7 .009 6.34 2.5 10.73 8.71 78.4 ٦ .009 le.47 1.9 8.69 10.72 78.3 7 6.50 .009 1.9 10.72 8.68 78.2 7 .009 6.45 1.8 10.71 8.68 78.1 8 .009 6.48 2.3 10.72 8.68 78.0 6 .009 1.9 6.51 10.70 8.68 78.0 6 .009 6.53 1.9 10.72 8.65 77.8 6 6.53 .009 1.9 10.70 8.64 77.2 6 6.54 .009 1.9 10.70 7.77 6 8.63 . 009 6.55 1.9 10.70 8.63 ר.רך 8 .011 6.54 2.1 10.68 8.62 77.6 6 6.55 .009 1.9 10.68 10.8 77.5 6 .009 6.56 1.9 10.70 8.60 77.5 . 009 6 6.55 1.9 10.69 8.60 77.4 6 .009 6.59 1.9 10.69 8.59 77.3 6 .009 6.57 1.9 10.68 9 8.59 77.3 .012 6.54 1.9 10.68 8.58 77.2 .009 6 4.57 1.9 8.57 10.67 77.1 .009 7 6.58 1.9 10.67 8.56 77.0 7 .009 1.9 6.58 10.67 8.53 76.7 6.60 1.9 6 .009 8.54 10.67 76.8 6.59 .008 3.1 4 8.43 53.7 10.69 .009 6.55 2.2 6 10.67 7.51 66.7 7 . 009 6.53 3.0 10.68 7.81 67.4 12 .018 6.35 43.2

 Image: set of the set of th



((633))	SMUD In situ Monitoring in the Upper American River	Page 2	of <u>2</u>
Stillwater Sciences	Project and Chili Bar Project	Date: 12	126/2016
	Reservoir - Water Quality Vertical Profiles		NCT (AD-
Site Location: Lat/Long (NAD83):	R-IS-3-66	Instrument used: Water depth:	
Personnel: <u>BC</u>	r BTH	Secchi (ft):	24
Site Notes:			

[Dep	oth	Temp	D	D	Conductivity	Specific Conductance	pН	Turbidity	Water	Notes
[(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	10163
[surfa	ace	10.75	8,82	79.4	7	0.009	6.55	1.9		
	3.3	1	10,74	8.7	78.4	7	0.009	6,56	1.0		
	6.6	2	10.73	3.66	78.0	7	0.009	6,58	1,9		
	9.8	3	10.72	8.64	77.8	7	0,009	6.60	1.9		
	13.1	4	10,72	8,62	77.7	7	0009	6.60	1.9		
_ L	16.4	5	10,70	8.60	77.4	7	0.004	6.58	1.8		
	19.7	6	10.63	8.59	77.2	9	0.002	6.57	1.9		
	23.0	7	10.62	8,59	77.2	8	9.0N	6.55	2,2		
1	26.2	8	10.61	4.57	77.0	7	0.009	6.57	1,9		
	29.5	9	10,60	8.56	76.9	7	0.009	6.60	1.9		
	32.8	10	10,60	8.56	76.9	7	0.009	6,59	1.9		8
	36.1	11	10,60	8.55	76.7	7	0.009	6,58	2,0		
_ L	39.4	12	10.64	8.54	76.7	7	0.009	6,66	8.1		Battom
~	42.7	13					0.0				
- F	45.9	14									
-	49.2	15									
- L	52.5	16									
H	55.8	17									
Ļ	59.1	18									
H	62.3	19									
-	65.6	20			_						
	68.9	21									
H	72.2	22									
H	75.5	23									
⊦	78.7	24									
ŀ	82.0	25									
H	85.3	26 27									
H	88.6	27									
⊦	91.9	28			· · · · · ·						
ŀ	95.1	30									
H	98.4	31									
	101.7	32									
	105.0	33									
- F	108.3	34									
L	111.5	34									



1035

20

Page | of [

Time:

Water depth:

Secchi (ft): __19

Date: 10/27/2016

10

SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project

Reservoir - Water Quality Vertical Profiles

Cce	
Stillwater	Sciences

R-IS-9-IHR

BT

BCR

Instrument used:

Site Location: Lat/Long (NAD83):

Personnel:

Site Notes:

De	pth	Temp	D	D	Conductivity	Specific Conductance	pН	Turbidity	Water	Notes
(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	Notes
sur	lace	12,44	8,96	83,9	12	0.016	6.15	1.6		
3.3	1	12.46	8.67	51,2	10	0.013	6,40	1.6		
6.6	2	12.45	8.61	80.7	10	0.013	6.47	1.4		
9.8	3	12,46	9.58	40.4	9	0,012	6,49	1.3		
13.1	4	12,46	8,56	80.2	9	0,012	6.51	1.3		
16.4	5	12.46	8,55	8011	9	0.012	6,55	1.3		
19.7	6	12.46	8153	80,0	ġ	0.012	6.56	1.9	5	
23.0	7	12.46	8,52	79,8	ģ	0,012	6.56	1.4		
26.2	8	12.46	8,51	79.9	9	0.011	6.56	1,3		
29.5	9	12.45	8,51	79,8	9	9.011	6,57	1.4		
32.8	10	12, 45	8,50	79.7	4	0,011	6.58	1,3		
36.1	11	12, 45	8,49	79.6	9	0.011	6.57	1,3		
39.4	12	12.45	8,49	7916		0.015	6,55	1,3		-
42.7	13	12,43	8,50	79.4	8	0.011	6.61	2.2		
45.9	14	12.34	8,46	79.0	9	0.011	6,60	1.4		
49.2	15	12, 13	8,41	78,2	8	0.011	6.59	1.3		
52,5	16	12.02	8,35	77.4	8	0.011	6.59	1.3		
55.8	17	11.54	8,25	75.5	8	0.011	6.58	1.4	04	
59.1	18	11,23	802	72.8	8	0.011	6.53	1,5		
62.3	19	10.79	7,60	68.2	8	0.011	6,48	1.5		
65.6	20	10130	7.11	62.7	8	0.011	6,43	13,2		Bettom
68.9	21									
72.2	22			-		1223			1. 1. 4.	54
75.5	23								-	
78.7	24									
82.0	25	1.2.1.1.4		-			-			A TANK IN A REAL PROPERTY OF
85.3	26									
88.6	27									
91.9	28									
95.1	29									
98.4	30			1						
101.7	31									
105.0	32									
108.3	33	_		-						
111.5	34									



	SMUD In situ Monitoring in the Upper American River	Page of
Stillwater Sciences	Project and Chili Bar Project	Date: 10/27/2016
	Reservoir - Water Quality Vertical Profiles	Time: 1080-1/00
Site Location: _ Lat/Long (NAD83):	R-IS-10-2HR	Water depth:
Personnel:	CR BTH	Secchi (ft):
Site Notes:		

Depth		Temp	DO		Conductivity	Specific Conductance	pН	Turbidity	Water	Notes	
(ft)	(m)	(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	Notes	
sur	face	12:41	8,49	79,5	12	0.016	-6,44	60			
3.3	1	12,49.	8.46	79.4	9	Q1912	6.51	1.4	1.4		
6.6	2	12,50	8.64	.61.0	9	0,012	657	13	1.11.11		
9.8	3	12,50	8.54	80,6	9	0.011	6.61	1.3	- 1		
13.1	4	12,51	8:57	80,4	9	0011	6.61	1.3			
16.4	5	12,51	8155	8012	9	Ord 11	6,62	1.3			
19.7	6	12,51	8.54	80,1	C)	0.011	6.63	1,4			
23.0	7	12.51	8.53	80.1	. 8	0.011	6.62	1.3			
26.2	8	12,51	8,53	60.0	8	0.011	6.62	1,3			
29.5	9	12.49	8,52	79,9	X	0.011	6.62	1.3			
32.8	10	12.50	8,51	79,9	8	01010	6.67	1.4			
36.1	11	12,49	815	79.8	10	0.014	6.64	1.4			
39.4	12	12,49	8,51	79.8	10	0.010	6,61	2,5			
42.7	13	12,47	8,51	79,8	8	0,010	6,67	1.5			
45.9	14	12,48	8,49	79,5	C	0.010	6,66	ta.g		Battom	
49.2	15			5 B B							
52.5	16		2.2						L.		
55.8	17		a			. 0					
59.1	18		1.345							e	
62.3	19					4				1	
65.6	20										
68.9	21		67	- 6						4	
72.2	22										
75.5	23							8			
78.7	24								-		
82.0	25									-	
85.3	26				5			-			
88.6	27		1.1				2				
91.9	28										
95.1	29				2 						
98.4	30				2						
101.7	31		- 1							4	
105.0	32									1	
108.3	33									8	
111.5	34										



SMUD In situ Monitoring in the Upper American River Project and Chili Bar Project

Reservoir - Water Quality Vertical Profiles

Page ____ of ____

Site Location: Lat/Long (NAD83):	R	-JS	5-11	-1	MR
Personnel: <u>B</u>	R	BTH			

Date: Time:	0/27/2018 1115-N35B
Instrument used: Water depth:	105 FT
Secchi (ft):	16

Site Notes:

Stillwater Sciences

Depth (ft) (m)		Temp	DO		Conductivity	Specific Conductance	pН	Turbidity	Water	Notes
		(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	NOTES
surface		12,51	8.99	84.4	11	0.015	6,50	1,0		
3.3	1	12,56	6,98	81.4	G	9,011	6.66	2,4		
6.6	2	12.56	8.59	8017	8	0.011	6.72	1,4		
9.8	3	12.56	8:56	60,4	8	0.010	6.74	14		
13.1	4	12.56	8.53	80.1	8	0,010	6.73	1.4		
16.4	5	12.56	8,51	80,0	в	0.010	6.75	1.3		6
19.7	6	12,56	6.50	79,8	8	0,010	6.74	1.3		
23.0	7	12.56	8,50	79,9	Š	0.010	6.76	1.3		
26.2	8	17.55	8.48	79.7	8	0.010	6.75	1,3		
29.5	9	12.56	8,47	79.6	8	0,010	6.75	1,3		
32.8	10	12.55	8,47	79.5	8	0.010	6.73	1.3		
36.1	11	12,55	8.47	79,5	0079	0.014	6.74	(13		
39.4	12	12,55	8,46	79.5	10	0.013	6,71	13		
42.7	13	12.54	8.44	79,2	8	0.010	6.74	2,2		
45.9	14	12.51	8,40	78.8	6	01010	6,73	14		
19.2	15	12:45	6,33	78.0	8	0.010	6.75	1,3		
52.5	16	12,26	8.21	76,4	g	0010	6.75	1.3		
55.8	17	11,25	7103	704	G	0.010	6,71	1.4		
59.1	18	10,57	6,92	61.2	7	0,0,0	6.62	115		
52.3	19	10,32	6,43	57.0	1	0.010	6,55	1,5		
5.6	20	9.87	6,10	53.5		0,010	6.6.48	1.6		
6.88	21	9,46	5,83	S0,4	1	0.011	6.41	1.5		
2.2	22	8.64	5,41	45.8	q	0.041	6.34	-1.4		-
75.5	23	8,22	500	42,2	10	0.015	6,26	14		
78.7	24	7.98	5.01	42,3	9	0.014	6.18	1,4		
32.0	25	7.85	4.60	38,6	7	0.0.11	0.01	1.5		8
35.3	26 27	7.74	4,47	37.3	8	0.011	5.97	1,4		
88.6	27	7.69	4.37	3616	4	0.01	597	114		
91.9	28	7.60	9.30	003	P	0.011	5,98	45		
95.1 98.4	30	7.48	3.90	320	R	0.011	5,97	116		
01.7	31	7.44	3,53	28.9	8 K	0.012	5,95	1.9		
05.0	32	7.32	3.01	201	q	0.012	5.91	211		
05.0	33	7,23	2,31	16,8	4	0/14	5,90	-13		
11.5	34	7,20	1183	15,0	7	0019	5,84	2,8		
	35	~ ~	1,73	14,3	1/			2 /		
	36		1.30	1017	10	0,017	5,86	3.1 59.8		Roll
	20	7.16	11.50	1				2410		Bottem

Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101



Heservoir - water Guainty Vertical Profiles Instrument used: $\frac{Y5J - 6920}{S3.7}$ Site Location: $R - J S - 12 - JR$ Lat/Long (NAD83): Personnel: BCR BTH Site Notes: Site Notes: Depth Temp DO Conductivity Specific Conductance pH Turbidity Water depth: $S3.7$ Site Notes: Site Notes: U U Conductivity Specific Conductance pH Turbidity Water depth: $S3.7$ Site Notes: Site Notes: Site Notes: U Site (ft): 0 Mater Mat	1000	SMUD In situ Monitoring in the Upper American R Project and Chili Bar Project Reservoir - Water Quality Vertical Profiles							ar D Ti		127/2016 349-0902
Depth Temp DO Conductivity Conductance pH Turbidity Water Sample (ft) (m) (°C) (mg/L) (%) (μS/cm) (mS/cm) (s.u.) (NTU) Notes		at/Long Person	(NAD83): _ nel: <u>B<i>C</i>_R</u>	R~J.					, Wate	er depth:	<u></u>
(IT) (IT) (IT) (ITC) (IT	Dej	Depth Temp		Dŕ	0	Conductivity		рН	Turbidity		Notes
surface 11,33 9.33 853 15 0.020 5.77 3.7	(ft)	(m)	(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Sample	
	TO EXAMPLE		11 22	0 22	nr + 2	10	0.0-	0.5	-		

1.4	((0)	(ing/L)	(/0)	(µo/om)	(mo/om)	(s.u.)	(1410)		
surf	face	11,33	9.33	853	15	0,020	5,77	3.7		
3.3	1	11.32	9.52	\$7.0	13	0,018	5.49	1.2		
6.6	2	11.31	9.53	87.1	13	0,018	5.49	1.1		
9.8	3	11,31	9,54	87.1	13	0.017	5.47	1.1		
13.1	4	11.30	9.53	87.1	13	0,017	5.53	1.1		
16.4	5	11,30	9,53	\$7.0	13	0,017	5.56	1.1		
19.7	6	11.28	9,52	86.9	12	0.017	5,60	1, 1		
23.0	7	11.27	9.51	86.8	12	9,017	5.63	1.1		
26.2	8	11.26	9.50	86,7	12	0.017	5.67	1.1		
29.5	9	11.23	9.49	86.5	12	0.017	5.70	1.1		
32.8	10	11,23	9.48	86.4	15	0.020	5.72	1.1		
36.1	11	11.21	9.48	86.4	14	0,019	5.76	1.1		
39.4	12	11.21	9.45	86.1	12	0.017	5,77	1.3		
42.7	13	11,21	9.44	86.0	13	0.017	5.80	1.3		
45.9	14	11.21	9.43	86.0	12	0.017	5.82	1.1	-	
49.2	15	11.21	9.42	85.8	12	0.017	5.83	1.2		
52.5	16	11.17	9.42	85.7	12	0.017	3.84	1.1		
55.8	17	11,08	9.41	85.5	12	0.017	5.86	1.2		
59.1	18	10.56	9.45	84.5	13	0,018	5.90	1.2		
62.3	19	10.24	9.46	84,2	13	0,018	5,94	1.8		
65.6	20	10.11	9.45	83.8	13	0,019	5.94	103.8		Bottom
68.9	21		100 m 100			1				
72.2	22					J			-	
75.5	23									
78.7	24						· · · · · ·			
82.0	25			1	1					
85.3	26			1 m m m m						
88.6	27					1				
91.9	28	-								
95.1	29									
98.4	30									
101.7	31			1		(
105.0	32					1		S		
108.3	33							-	Provide state	
111.5	34	()							-	



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Stillwater Scie	nces

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

 Instrument(s) used:
 YSI
 6920
 Crew:
 KEC
 HBCR

 Site Location:
 IS IS Site Location:
 IS IS-

				In situ				
Temp	DO Conductivity Specific pH Turbidity Notes		Notes					
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)		
5.75	10.41	83.2	15.0	0.024	6-(1	1.1	12	
						50		

IS-8-SFRR	GPS:
11/7/2016	Time: 1:40 AM
	Weather: Sunny, Cold
	IS- 8-SFRR 11/7/2016

				In situ				
Temp	DO		Conductivity	Specific Conductance	pН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)		
6.84	10,33	84.8	13	0.023	6.64	1.2		
		-						

Date Phot Note	os:	7/2016				Time: Weath	er: Sunny, Col
				In situ			
Temp	D	DO C		Specific Conductance	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
6.53	9.87	80.4	34.0	0.052	6.68	1.0	



page 2 of 2

Date: Photo Notes	: <u> </u>	<u> </u>	5-60			GPS: Time: Weath	er: Sunny, Cool
				In situ			
Temp	DO		Conductivity	Specific Conductance	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
6.86	10.00	82.0	12.0	0.023	6.90	1.3	

Site Location: 18-4-6C	GPS:
Date: <u>11/2016</u> Photos:	
Notes:	Weather: Sunny, Cool

Тетр	DO		DO Conductivity		pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	Conductance (mS/cm)	(s.u.)	(NTU)	Notes
3.98	9.28	B0.2	10.0	0.014	7.12	1.3	

Date Pho Note	tos:	-12016 	(- RK			GPS: Time: Weath	= 3:30 PM er: Sunny, Cool
				In situ			
Temp	DO		Conductivity	Specific Conductance	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.19	9.79	77.(6.0	0.009	6.60	1.0	



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Stillwater Sciences

Instrument(s) used:

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page _____ of _____

American River Project and Chili Bar

Crew: KKC + BCR

Site I Date: Photo Notes	bs:	IS	2 - LRR			GPS: _ Time: _ Weath	IO:10 AM er: Sunny, Cool
				In situ			
Temp	D	0	Conductivity Specific Conductance		рН	H Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Notes
5.95	9.95	78.3	7.0	0.011	7.19	1.2	
						-	

0.50
GPS:
Time: 11:00 AM
Weather: Sunny, Cool
-

				In situ			
Temp	D	0	Conductivity	Specific Conductance	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	Notes
0.55	9.93	81.0	5.0	0.008	6.73	1.1	

Date Phot Note	os:	1/16		2		Time: Weath	er: Sunny, Cool
				In situ			
Temp	DO		- CONDUCTIVITY	Specific Conductance	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	Notes
7.60	9.31	78.0	7.0	0.011	5.60	3.5	



page 2 of 2

Site L Date: Photo Notes	u]*	<u>TS-</u> 1 2016	IL-SFSC			GPS: Time: Weath	10:20 AH. er: Scony, Cool
				In situ			
Temp	D	DO Conductivity	Specific pH Conductance	Turbidity	Notes		
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)	
5.29	10.61	84.0	10.0	0.016	6.05	2.5	
			8-				

Site Location: IS - 12 - 5C	GPS:			
Date: 119/2016	Time: 10:40 AM			
Photos:	Weather: Sunny, Cool			
Notes:				

In situ								
Temp	DO		Conductivity	Specific Conductance	рН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)		
8.58	9.87	84.5	8.0	0.04	6.00	2.7		
						_		

Date Phot Note	os:/	2016		Weather: Sunpy, Cool					
				In situ					
Temp	D	0	Conductivity	Specific Conductance	рН	Turbidity	Notes		
(°C)	(mg/L)	(%)	(µS/cm)	(mS/cm)	(s.u.)	(NTU)			
9.47	10.40	91.0	12.0	0.018	6.90	3.1			



Stillwater Sciences	

SMUD *In situ* Monitoring in the Upper American River Project and Chili Bar Project

Page _____ of ____

Instrument(s) used:	451	6920	

Crew: KKC + BCR.

Date Phote Notes	: os:	9/2016	14 - 5C			GPS: Time: Weath	12:00 PM er: Sunny, Cool
				In situ			
Temp	D	0	Conductivity	Specific P Conductance P	рН	Turbidity	Notes
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	Thores .
10.47	10.16	91.0	13.0	0.017	6.86	3.1	

Site Location: IS - 15 - SFAR	GPS:
Date: 11/10/16	Time: 9:000
Photos:	Weather: Clear, Cool
Notes:	Clear, Los

Temp	D	D	Conductivity	In situ Specific Conductance	pН	Turbidity	Notes
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	Notes
9.00	10.09	87.3	30.0	0.043	6.02	1.1	

Date Phot Note	os:	16	- 16 - SFAR			GPS: Time: Weath	9:30AM er: Clear, Cool	
	3			In situ				
Temp	D	0	Conductivity	Specific Conductance	pН	Turbidity	Notes	
(°C)	(mg/L)	(%)	(μS/cm)	(mS/cm)	(s.u.)	(NTU)	Notes	
0.57	10.42	93.6	19.0	0.027	6.17	1.2		



page 2 of 2

Pho	nos:	10/16	17- BC			GPS: Time: Weath	10:00 AM	
Note	əs:					-		
21.5				In situ				
Temp		00	Conductivity	Specific Conductance	рН	Turbidity	Notes	
(°C)	(°C) (mg/L) (%		(µS/cm)	(mS/cm)	(s.u.)	(NTU)	littles	
11.59	9.95	91.4	22.0	0.030	6.27	39.6	Very turbid, brown water.	
Site	Location:	75.	19-SFAR			GPS:		
Date Phot Note	tos: <u>11 10</u>	216	FT STRE			Time:	II:40 AM er: Sunny, Cool	
				In situ				
Temp		0	Conductivity	Specific Conductance	рН (s.u.)	Turbidity	Notes	
(°C)		(mg/L) (%)	(µS/cm)	(mS/cm)		(NTU)		
	10.44 MORE ,	93.0	18.0	0.025	6.60	3.7		
10.33								
Date:	: 11/10	IS -	18-SFAR			GPS: Time:	12:40 PM	
Site	: <u> /18</u> os:	<u> </u>	18-SFAR			Time:	12:40 PM	
Site I Date: Photo	: <u> /18</u> os:	<u> </u>	18-SFAR	In situ		Time:	12:40 PM 12:40 PM	
Site I Date: Photo Note: Temp	: _!!/15 ps: s: DC	> (16 D	Conductivity	In situ Specific Conductance	рН	Time: Weathe	12:40 PM 5: Suny, Col	
Site I Date: Photo Notes	:/15 os: s:	» (Ke		Specific	рН (s.u.)	Time: Weathe	r: Sung, col	
Site I Date: Photo Note: Temp		> (16 D	Conductivity	Specific Conductance		Time: Weathe Turbidity	r: Sung, col	



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

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APPENDIX E In situ Field Calibration Sheets



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

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pH 10

Turbidity

Turbidity

pH 10

12.7



Stillwater Sciences				Calibration -	
Project: UARP	CB W	Q MONIT	DRING - R	lverine in	ISITUFEB 2016
Unit ID:YSI_ 6°		1 1	1		
Sampling Event Date	(s):2	8-2/10	2016		
		PRF-S	AMDUNC CA	LIDDATION	
Date and time _	2/8/16	7:30 AM	_ Name	LIBRATION BRUCE HITC	
Date and time _ Parameter	2 8 16 Std. Value	7:30 AM Std. Temp	Name Pre-Cal Value	Post-Cal Value	Notes
	Std.	7:30 AM Std. Temp	Name Pre-Cal Value	Post-Cal	_
Parameter	Std. Value	7:30 AM Std. Temp (°C)	Name Pre-Cal Value	Post-Cal Value	_
Parameter Cond (uS/cm @ 25°C)	Std. Value 1,000	7:30 AM Std. Temp (°C) 19.49	Name Pre-Cal Value	BRUCE HIT Post-Cal Value 1,000 10,000 87.9	Notes
Parameter Cond (uS/cm @ 25°C) Cond (uS/cm @ 25°C)	Std. Value 1,000	7:30 KM Std. Temp (°C) 19.49 20.25	Name	Post-Cal Value	Notes Check solubility table* @ 66, 5 mmHg
Parameter Cond (uS/cm @ 25°C) Cond (uS/cm @ 25°C) D0 (%)	Std. Value 1,000	7:30 AM Std. Temp (°C) 19.49 20.25 20.20	Name Pre-Cal Value 1042 5,479 89.0	BRUCE HIT Post-Cal Value 1,000 10,000 87.9	Notes

Date and time 28/16 6:00 pm Name_____

10.06

13.2

10.03

19.18

19.75

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value		Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	20.89	1,800	Y	1.000	Q	
Cond (uS/cm @ 25°C)	10,000	20.84	9787	N		A	
DO (%)		21.21	87.4	N		A	
DO (mg/L)		21.21	7.76	N		A	Check solubility table
pH4	pH4	20.64	4.03	N		A	7.8 mg/2 @668
рН 7	pH 7	21.00	6.93	N		A	J mi
pH 10	pH 10	20.99	9.99	N		A	
Turbidity	12.7	21.06	12.6	N		A	
Turbidity				5			
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units Accept		Qualify	Reject
Dissolved oxygen	% saturation	5% >5% a		> 10%
Conductivity	uS/cm ≤ 5%		> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences	$pg \stackrel{2}{\rightarrow} of \frac{3}{2}$
	Water Quality YSI 6920 Sonde Calibration - Daily Use
Project: UMP * CB	NQ MONITORING - RIVERINE IN SITU FEB 2016
Unit ID: YSI 6920	
Sampling Event Date(s)	2/8-2/10/2016
	PRE-SAMPLING CALIBRATION

Date and time 28/16 7:30 AM Name BULCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.49	1,042	1.000	
Cond (uS/cm @ 25°C)	10,000	20.25	5,479	10,000	
DO (%)		20.20	89.0	87.9	
DO (mg/L)*		20.20	8.04	7.94	Check solubility table* @ 669.5 MM
pH4	pH4	19,32	4,24	3.99	7.9/8.0 mg/L
рН 7	pH 7	18.95	6.81	7.00	, le c l'
pH 10	pH 10	19.18	10.06	10.03	
Turbidity	12,7	19,75	13.2	12,7	
Turbidity					

Date and time 29/16 18:00 Name BRUEE HITCH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value		Post-Cal Value	MQO Code ¹	Notes	
Cond (uS/cm @ 25°C)	1,000	19.76	1.030	N		A		1
Cond (uS/cm @ 25°C)	10,000	19.88	8723	N		Q		1
DO (%)		19.81		N		A		1
D0 (mg/L)		19.81	7.91	N		A	Check solubility table]
pH4	pH4	20.03	4.04	N		A	@ 669.3 mity	7.9
рН 7	pH 7	20.09	6.97	N		A		ng
pH 10	pH 10	20.01	9.95	N		A]
Turbidity	12.7	20.03	12.6	N		A]
Turbidity								
¹ See Table 1								1

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units Accept		Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(Stillwater Sciences

Water Quality YSI 6920 Sonde Calibration - Daily Use

Project: _____ SMUD WARP RESERVOIR WA SURVEN

Unit ID: MSI 6920

Sampling Event Date(s): 4/25 - 4/28 2016

Date and time 4/24 (16)4:50 Name BROCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	12.14	952	1,00)	
Cond (uS/cm @ 25°C)	10,000	19.10	9731	10000	
DO (%)		19.46	97.0	95.7	
DO (mg/L)*		19.46	8.91	8.79	Check solubility table* 727 mm Hz
pH4	pH4	19.12	4.07	4.00	8.7 mg/L
рН 7	рН 7	18.77	4.48	7.00	0,-
pH 10	pH 10	19.39	9.31	10.00	
Turbidity	12.7 NON	19.25	12.9	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>4/25/ 16 15:50</u> Name BRocs 4)

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	19.32	1011	No		ACCEPT	
Cond (uS/cm @ 25°C)	10,000	19.46	10110	NO		ACCEDT	
DO (%)		19.49	86.6	No		ACCEPT	GLOZ. 3 mm/Hg
D0 (mg/L)		19.49	7.95	No		ACCEPT	Check solubility table
pH4	pH 4	19.20	4.29	No		QUALIEL	7.9 mg/L
рН 7	pH 7	19.31	7.06	No	_	ALCEPT	0,
рН 10	pH 10	19.38	10.12	No		ACEPT	
Turbidity	12.7	19.17	12.7	No		ACEPT	
Turbidity							
¹ See Table 1							1

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

Stillwater Sciences

 $pg \stackrel{2}{-} of \stackrel{4-}{-}$ Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: SMUD WARP RESERVOIR WQ SURVEY

Unit ID: 151 6920

Sampling Event Date(s): 4 / 25 - 4 / 28 2016

Date and time 4 26 / 16 6:45 Name BROCE HATCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.23	1057	1000	
Cond (uS/cm @ 25°C)	10,000	20.28	9636	10 000	
DO (%)		20.21	86.3	87.0	662.1 mm / 48
DO (mg/L)*		20,21	7.83	7.84	Check solubility table*
pH4	pH4	20.12	4.23	4.00	7.8 mg / L
рН 7	pH 7	20.2)	7.89	7.00	0/=
pH 10	pH 10	20.15	9.76	10.0	
Turbidity	12.7	20.19	12.9	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK

Date and time $\frac{4/26}{16}$ 18:00 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	20.43	1077	NO		ACCEPT	
Cond (uS/cm @ 25°C)	10,000	20.65	10370	NB		ACCEPT	-
DO (%)		20.40	84.8	NO		ACCEPT	463.4 mm/ Ha
D0 (mg/L)		20.40	7.81	NO		ACCEPT	Check solubility table
pH4	pH 4	20.54	4.03	No		ACCEPT	7.8 mg/
pH 7	pH 7	20.90	7.09	No		ACCEPT	0.
pH 10	pH 10	20.64	9.98	No		ACCEPT	
Turbidity	12.7	20.56	12.7	No		ACCEPT	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(Water Quality YSI 6920 Sonde Calibration – Daily Use Stillwater Sciences Project: SMUD WARP RESERVOIR WO SURVEY Unit ID: 45, 6920

Sampling Event Date(s): 4/25 - 4/28 2016

 PRE-SAMPLING CALIBRATION

 Date and time
 4/2-7/16
 6:30
 Name
 BRIVE HTCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.70	1085	1000	
Cond (uS/cm @ 25°C)	10,000	20.15	9470	10 000	
DO (%)		20.27	84.5	87.0	(dol. 1 mm / Ha
DO (mg/L)*		20.27	7.82	7.85	Check solubility table*
pH4	pH4	20.84	4. 55	4.00	7.8 mg/L
рН 7	pH 7	20.77	7.59	7.00	0
pH 10	pH 10	20.97	9.54	9.98	
Turbidity	12.7	20.44	12.8	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time 4/27/16 19:00 Name 3RULE HITE H

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	19.99	1024	NO		ACCEPT	
Cond (uS/cm @ 25°C)	10,000	20.49	10110	NO		ACCEPT	
DO (%)		20.14	37.2	No		ALCEPT	(259.6 mm/Hg
*D0 (mg/L)		20.14	7.91	No		ACCEPT	Check solubility tuble
pH4	pH 4	20.49	4.18	No		ALCEPT	2.8 mg/L
рН 7	pH 7	18.77	7.16	No		ACEPT	0
pH 10	pH 10	16.44	9.97	No		ACCEPT	
Turbidity	12.7	20.47	12.8	NO		ACCEPT	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Turbidity

Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

Stillwater Sciences	Water	Quality YSI	6920 Sonde	Calibration –	pg <u>4</u> of <u>4</u> Daily Use
Project: SMUD U	ARP RE	SERUDIK	wa sur	NEY	
Unit ID: 451 6920	0				
Sampling Event Date	(s): 4/2	25 - 4/2	8/2016		
Date and time _	4/28/	PRE-S	AMPLING CA	LIBRATION	CPRUE
Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.69	1,033	1,000	
Cond (uS/cm @ 25°C)	10,000	20.79		10,000	
DO (%)		20.20	86.9	86.7	Check solubility table*
DO (mg/L)*		20.20	7.83	7.81	Check solubility table* 5
pH4	pH4	10.55	6-81	4.00	7.8 mg L
pH 7	рН 7	20.01	5.62	6.99	51
pH 10	pH 10	20.16	11.22	10.10	
Turbidity	12.7	20.72	12.7	12.7	

12.7

12.7

POST-SAMPLING CALIBRATION CHECK Date and time 4/28/2016 17:00 Name BRUCE HITCH

20.72

12.7

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	17.16	972	NO		ASCERT	QUALIFY
Cond (uS/cm @ 25°C)	10,000	19.17	9635	No		ACSPT	
DO (%)		18.75	96.2	No		Accept	
DO (mg/L)		18.75	8.96	NO		AFCEPT	Check solubility table O
pH4	pH 4	18.46	3.91	No		ACCEPT	8.9 mg/L
рН 7	pH 7	16.84	6.95	NO		ACCEPT	0
pH 10	pH 10	17.40	9.96	No		ACCEPT	
Turbidity	12.7	19.66	12.7	NO		AKOEPT	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(COD) Stillwater Sciences $pg \perp of 4$ Water Quality YSI 6920 Sonde Calibration - Daily Use Project: SMUD UARP RIVERINE WO SURVEY Unit ID: 481 6920 Sampling Event Date(s): 5/1 - 5 4 16 PRE-SAMPLING CALIBRATION 8:00AM Date and time 511 16 Name KELLEIGH CROWE Parameter Std. Std. Pre-Cal **Post-Cal** Notes Value Temp Value Value (^{0}C) Cond (uS/cm @ 25°C) 1,000 1888 088 0990 Cond (uS/cm @ 25°C) 10,000 18.70 8945 (0,000 DO (%) 724.4 mm Ha 18.367 95.8 95.3 DO (mg/L)* 18.67 8.85 8.92 pH4 pH4 18.48 4.33 4.00 8.9 mg/L рН 7 pH 7 18.79 6.97 7.00 pH 10 pH 10 9.95 18.68 9.95 Turbidity 12.7 18.78 12.7 12.7 Turbidity

> POST-SAMPLING CALIBRATION CHECK Date and time 5/1/16 18:00 Name BRUCE HTTH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	20.88	1032	No		ACCEPT	
Cond (uS/cm @ 25°C)	10,000	21.10	10349	NO		ACCEPT	
DO (%)		20.20	87.4	No		Accept	660.0 mm/Hs
D0 (mg/L)		20.20	7.90	No		ACCEPT	Check solubility table 0
pH4	pH 4	20.71	3.92	NO		ACCEPT	7.8
рН 7	pH 7	20.68	6.86	NO		ARCEPT	
pH 10	pH 10	20.61	9.79	No		ACCEPT	
Turbidity	12.7	20.81	12.3	No		ACCEPT	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



 Stillwater Sciences
 $pg \angle of \underline{4}$

 Water Quality YSI 6920 Sonde Calibration - Daily Use

 Project: \underline{SHUD} UARP CIVERINE WO SURVEY

 Unit ID: $\underline{YSI \ L920}$

 Sampling Event Date(s): $\underline{5/1 - 5/4}$ 2016

 PRE-SAMPLING CALIBRATION

 Date and time $\underline{5/2/16 \ 8:\infty \ AM}$ Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.91	1.181	1,000	
Cond (uS/cm @ 25°C)	10,000	14.23	7788	10,000	
DO (%)		18.81	88.20	87.3	663.3 mm Hq.
DO (mg/L)*		18.81	8.21	8.13	Check solubility table*
pH4	pH4	19.89	3.94	4.00	8.1 mg/L
рН 7	рН 7	19.95	6.99	7,00	5,
pH 10	pH 10	19.96	9.91	10.00	
Turbidity	12.7	19.64	12.7	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>5/2/16 5:30 PM</u> Name <u>KELLEIGH CRowe</u>

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	21.94	1200	NO		QUAL	FY
Cond (uS/cm @ 25°C)	10,000	21.34	11250	NO		QUAL	IFY
DO (%)		20.92		NO		ACCEPT	663.1 mm/Ha
D0 (mg/L)		20.92	7.75	NO		ACCEP	Check solubility table
pH4	pH 4	22.47	3.74	NO			QUALIFY 7.8 Mg
pH 7	pH 7	22.23	6.77	NO		QUAL	
pH 10	pH 10	21.07	9.99	NO		ACCE	PT
Turbidity	12.7	21.27	12.6	NO		ACCE	PT
Turbidity			a ::				
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Co Stillwater Sciences

Water Quality YSI 6920 Sonde Calibration – Daily Use pg **3** of <u>4</u>

Project: SMUD VARP RIVERINE WA SURVEY

Unit ID: 451 6920

Sampling Event Date(s): <u>5/1 - 5/4/2016</u>

Date and time 8:30 AM 53/16 Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.92	1.235	1000	
Cond (uS/cm @ 25°C)	10,000	20.84	9107	10,000	
DO (%)		20.96	87.3	87.2	662.8 mm/Ha
DO (mg/L)*		20.96	7.80	7.77	Check solubility table*
pH4	pH4	20.90	4.23	3,99	TITMALL
рН 7	pH 7	21.00	6.75	7.01	
рН 10	pH 10	21.09	10.28	10.05	
Turbidity	12.7	20.94	12.5	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>5/3/ ال الان</u> اله: 30 Name تك من ال

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	22.97	997			ACCEPT	
Cond (uS/cm @ 25°C)	10,000	23.15	10 500			ALCEPT	
DO (%)		23.02	86.4			ACCEPT	(62.2 mas) Hg
D0 (mg/L)		23.02	7.40			ALCERT	Check solubility table O
pH4	pH 4	23.12	3.91			ACCEPT	7.5
рН 7	pH 7	23.02	7.08			ACCEPT	
pH 10	pH 10	23.06	10.20			ACCEPT	
Turbidity	12.7	23.52	12.9			ACCEPT	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: SMUD VARP RIVERINE + RESERVOIR WG SURVEY

Unit ID: 45, 6920

Sampling Event Date(s): ____ 5 /17

Date and time 5/16/16 19:00 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	25.31	1073	1000	
Cond (uS/cm @ 25°C)	10,000	25.82	93,6	10001	
DO (%)		23.70	82.4	87.1	662.7 mm/He
D0 (mg/L)*		23.70	6.96	7.35	Check solubility table*
pH4	pH4	24.82	4.20	4.00	7.3 mg 12
рН 7	pH 7	24.70	6.87	7.00	0/
pH 10	pH 10	25.54	10.45	10.02	
Turbidity	12.7	26.05	12.4	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK

Date and time 5/17/16 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	24.17	1050			ACCEPT	
Cond (uS/cm @ 25°C)	10,000	24.26	10092			ACCEPT	
DO (%)		23.61	99.9			ACCEPT	759.5 ma 140
D0 (mg/L)		23.61	8.47			ACCEPT	Check solubility table 0
pH4	pH 4	24.41	4.03			ACCEPT	8.5 mg /L
рН 7	pH 7	24.06	6.89			ACCEPT	0.
pH 10	pH 10	24.05	9.96			ACCEPT	
Turbidity	12.7	24.11	13.2			ARCEPT	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept Qualify		Reject		
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	0% > 10%		
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%		
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5		
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%		



Com Stillwater Sciences

pg 4 of 4 Water Quality YSI 6920 Sonde Calibration - Daily Use

Project: SMUD VARP RIVERINE WQ- SURVEY

Unit ID: 75t 6920

Sampling Event Date(s): 5/1 - 5/4/2016

 PRE-SAMPLING CALIBRATION

 Date and time
 5/4/16
 8:00
 Name
 BRUCE
 Hitch

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	22.45	7 111	1000	
Cond (uS/cm @ 25°C)	10,000	22.43	9302	10000	
DO (%)		22.13	867	86.9	[do0. 1 mm] Ho
D0 (mg/L)*		22.13	7.57	7.57	Check solubility table*
pH4	pH4	22.42	3.96	4.00	7.5 ma/L
рН 7	pH 7	22.36	7.03	7.00	0
рН 10	pH 10	23.39	10.24	10.05	
Turbidity	12.7	22.30	12.5	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>5 /4 / 16 / 5:00</u> Name BRuce Hircit

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	22.25	1050			ACCEP-	r
Cond (uS/cm @ 25°C)	10,000	22.84	10047			ACCEPT	-
DO (%)		21.85	95.3			ALLEPT	723.5 mm/14
D0 (mg/L)		21.85	8.34			ACCEPT	Check solubility table
pH4	pH 4	22.09	3.97			ACCEPT	8.3 mg/L
рН 7	pH 7	21.87	7.17			HICEPT	0.
рН 10	pH 10	21.75	10.17			Accept	
Turbidity	12.7	22.74	13.1			ACCEPT	
Turbidity							
¹ See Table 1							

Parameter	Parameter Units Accept		Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(COD) Water Quality YSI 6920 Sonde Calibration – Daily Use $pg \stackrel{\mathbb{Z}}{=} of \stackrel{\mathbb{U}}{=}$ Stillwater Sciences Project: WARP WA SUMMER ZOIL

Unit ID: ______ bgzo

Sampling Event Date(s): 8/22 - 8/26

 PRE-SAMPLING CALIBRATION

 Date and time
 8/24
 סז: ۵٥
 Name
 ארירא

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.63	1127	1000	
Cond (uS/cm @ 25°C)	10,000	19.45	8898	10000	
DO (%)		19.20	98.3	98.5	
DO (mg/L)*		19.20	8.63	8.65	Check solubility table*
pH4	pH4	19.62	3.92	4.00	
рН 7	pH 7	19.45	6.90	7.00	
рН 10	pH 10	19.72	10.04	10.00	2
Turbidity	12.7	18.98	11.4	12.7	
Turbidity		22			2

 POST-SAMPLING CALIBRATION CHECK

 Date and time
 8/24
 15:00
 Name
 BRUCE
 HITCH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	24.00	1017	NO		A	
Cond (uS/cm @ 25°C)	10,000	33.95	9717	NO		A	
DO (%)		22.31	92.8	No		A	711 mm/He
*D0 (mg/L)		22.31	7.9	NO		A	Check solubility table 🛇
pH4	pH 4	24.04	3.91	No		A	8.0-8.1
рН 7	pH 7	24.89	6.87	No		A	
pH 10	pH 10	27.40	9.99	No		A	
Turbidity	12.7	24.77	12.4	NO		A	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(Stillwater Sciences

 $pg \underline{3} of \underline{4}$

Water Quality YSI 6920 Sonde Calibration - Daily Use

Project: __ UARD + CHILI BAR WQ SUMMER 2016

Unit ID: ____ 5, 6920

Sampling Event Date(s): 8/22 - 8/26

Date and time 8/25 07:00 Name 3Rvc5 Hurch

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.57	1103	1000	
Cond (uS/cm @ 25°C)	10,000	19.42	8701	9996	
DO (%)		18.34	N. 8	92.9	
D0 (mg/L)*		18.34	8.71	8.7Z	Check solubility table*
pH4	pH4	19.67	3.98	4.00	
рН 7	pH 7	19.95	6.90	7.00	
рН 10	pH 10	19.40	10.11	10.00	
Turbidity	12.7	18.35	10.4	12.7	
Turbidity					

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	21.77	1050	NO		A	
Cond (uS/cm @ 25°C)	10,000	21.92	9725	NO		A	
DO (%)		22.89	93.8	20		¥	707.5 14
D0 (mg/L)		22.89	8.03	ND		A	Check solubility table Ø
pH4	pH4	21.71	3.94	NO		A	8.0 mg/L
рН 7	pH 7	21.53	6.89	NO		A	0
pH 10	pH 10	21.8)	9.93	MO		A	
Turbidity	12.7	23.91	13.2	NO		A	
Turbidity							
¹ See Table 1							-

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



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Water Quality YSI 6920 Sonde Calibration – Daily Use pg - 4 of - 4

Project: UARP + CHILL BAR WQ SUMMER ZOID

Unit ID: _____951 6920

Sampling Event Date(s): _____ 色/ 2ヱ_ - ぉ/ヱ6

Date and time 8 26 07:00 Name KELEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	19.18	1003	1000	
Cond (uS/cm @ 25°C)	10,000	18.65	8885	10,001	
DO (%)		18.17	93.4	92.9	
DO (mg/L)*		18.17	8.80	8.70	Check solubility table*
pH4	pH4	18.78	3.99	4.00	
рН 7	pH 7	19.25	6.95	7,00	
pH 10	pH 10	18.91	10.05	10.00	
Turbidity	12.7	18.63	13.3	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time 8/26 18:00 Name 38:00 Name

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	25.88	1036	Na		A	
Cond (uS/cm @ 25°C)	10,000	26.16	10357	No		A	
DO (%)		26.04	95.4	NO		A	727.3 mm 14g
D0 (mg/L)		26.06	7.73	NO		A	Check solubility table
pH4	pH 4	26.58	4.09	NO		A	7.7 mg/L
рН 7	pH 7	26.30	4.96	NO		A	1
pH 10	pH 10	24.57	9.94	No		A	
Turbidity	12.7	26.78	13.0	NO		A	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(COD) Stillwater Sciences

Water Quality YSI 6920 Sonde Calibration – Daily Use $pg \ l \ of \ 4$

Project: UARP RESERVOIR WA FALL ZOIL

Unit ID: 451 6920

Sampling Event Date(s): 10/23 - 10/27

PRE-SAMPLING CALIBRATION

Date and time 10/25 Z1:30 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	23.40	1078	998	
Cond (uS/cm @ 25°C)	10,000	22.74	90zy	99999	
DO (%)		20.34	91.9	95.2	207.5 no/4
D0 (mg/L)*		20.34	8.28	8.49	Check solubility table* 8.4 mg/L
pH4	pH4	22.35	4.05	4.00	
рН 7	pH 7	22.42	6.96	7.00	
pH 10	pH 10	21.93	9.93	9.99	
Turbidity	12.7	21.40	12.5	12.7	
Turbidity					

 POST-SAMPLING CALIBRATION CHECK

 Date and time 10 24 16:30

 Name Keuelon Crowe

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	19.47	1113	NO		0	
Cond (uS/cm @ 25°C)	10,000	19.50	9238	N		Q	
DO (%)		19.20	95.5	N		A	710.10 mm/H
DO (mg/L)		19.20	8.82	N		A	Check solubility table
pH4	pH 4	19.75	3.96	2	5	A	B. G mg /L
pH 7	pH 7	19.93	6.92	N		A	0
pH 10	pH 10	19.84	9.95	N		A	
Turbidity	12.7	18.75	12.70	N		A	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



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pg <u>2</u> of <u>4</u> Water Quality YSI 6920 Sonde Calibration − Daily Use

Project: UARP RESERVOIR WQ FALL 2016

Unit ID: 451 6920

Sampling Event Date(s): 10 23 - 10 27

Date and time _	10/25		_ Name	KELLEI GH	CROWE	
Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes	
Cond (uS/cm @ 25°C)	1,000	20.25	1043	1000		
Cond (uS/cm @ 25°C)	10,000	20.25	8245	10,00%		12
DO (%)		19.82	95.3	93.4		710.6 2004
D0 (mg/L)*		19.82	8.67	8.50	Check solubility table*	8.5 ms/
pH4	pH4	20.51	4.00	4.00		0.0
рН 7	pH 7	20.51	6.96	7.00		
рН 10	pH 10	20.73	10.12	10.02		
Turbidity	12.7	19.52	12.1	12.7		
Turbidity				,		

PRE-SAMPLING CALIBRATION

POST-SAMPLING CALIBRATION CHECK

Date and time 16/25 16:30 Name BRUCE HACH

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	19.24	1184	No		Q	
Cond (uS/cm @ 25°C)	10,000	19.10	9848	No		A	
DO (%)		18.02	93.7	NO		A	710. 8 mm Ha
D0 (mg/L)		18.02	8.86	NO		A	Check solubility table 0
pH4	pH 4	19.34	3.95	NG		A	8.8 mg/L
рН 7	pH 7	19.68	4.92	NG		A	0/
рН 10	pH 10	19.53	9.95	No		A	
Turbidity	12.7	19.00	12.8	No		À	
Turbidity							
¹ See Table 1			•				

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



(Stillwater Sciences

pg <u>3</u> of <u>4</u> Water Quality YSI 6920 Sonde Calibration - Daily Use

Project: UARP WQ RESERVOIR FALL 2016

Unit ID: 451 6920

Sampling Event Date(s): ____ 10 23 - 10/27

PRE-SAMPLING CALIBRATION

Date and time 10/24 6:30 Name BRUCE HITCH

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	18.34	1001	1000	
Cond (uS/cm @ 25°C)	10,000	18.44	9481	10 000	
DO (%)		18.54	43.5	53.6	711.0 mm/ Ha
D0 (mg/L)*		17.54	8.92	8.92	Check solubility table*
pH4	pH4	18.95	4.13	4.02	8.9 mg ! L
рН 7	pH 7	19.23	6.86	7.00	0
рН 10	pH 10	19.12	10.08	10.00	
Turbidity	12.7	18.24	13.0	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>וסלבל ארדכון</u> Name אריכבן

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	17.98	1178	No		Ø	
Cond (uS/cm @ 25°C)	10,000	18.01	9897	No		A	
DO (%)		17.37	93.9	04		A	709.2 mm/Ha
DO (mg/L)		17.37	8.99	NO		A	Check solubility table
pH4	pH 4	18.28	4.01	No		A	9.00 mg/L
рН 7	pH 7	18.33	6.91	NO		A	0
рН 10	pH 10	18.35	9.91	No		A	
Turbidity	12.7	17.58	13.5	No		9	
Turbidity							
¹ See Table 1							

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences

Water Quality YSI 6920 Sonde Calibration – Daily Use

Project: UARP wa RESERVOIL FAU 2016

Unit ID: 759 6920

Sampling Event Date(s): 10/24 - 10 / 27

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	18.54	1198	1000	
Cond (uS/cm @ 25°C)	10,000	18.29	8400	10000	
DO (%)		.7.43	93.8	93.2	708.0 nm/40
DO (mg/L)*		17.43	8.98	8.92	Check solubility table*
pH4	pH4	18.79	4.09	4.01	8.9 mc/c
рН 7	pH 7	19.00	7.02	7.00	1)/
pH 10	pH 10	13.93	9.90	10.00	
Turbidity	12.7	17.48	13.4	12.7	
Turbidity			- A-		

Date and time 10/27 6:30 Name ALAN HITCH

POST-SAMPLING CALIBRATION CHECK Date and time)

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	17.72	1157	No		R	
Cond (uS/cm @ 25°C)	10,000	17.85	9772	No		A	
DO (%)		19.24	96.5	No		4	728.3 mm/Ha
D0 (mg/L)		19.24	8.89	No	2	A	728.3 mm/Hs Check solubility table
pH4	pH 4	18.67	3.97	No		A	8.8 mg/L
рН 7	pH 7	18.23	6.95	No		A	0
рН 10	pH 10	18.53	10.02	No		A	
Turbidity	12.7	19.41	12.7	No		A	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%

Ver: 01/2016



Stillwater Sciences Water Quality YSI 6920 Sonde Calibration - Daily Use Project: UARP WERINE FALL 2016

Unit ID: 451 6920

Sampling Event Date(s): <u> 11</u> - 11 (11

PRE-SAMPLING CALIBRATION

Date and time 16 5:00 PM Name KELLEIGH CROWE.

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	17.29	879	1000	
Cond (uS/cm @ 25°C)	10,000	17.51	9171	10,002	
DO (%)		17.98	80.1	79.5	604.6 mm/Ha
DO (mg/L)*		17.98	7.59	7.50	Check solubility table*
pH4	pH4	17.62	3.88	4.00	7.5 ma/L
рН 7	рН 7	15.95	7.03	7.00	8
pH 10	pH 10	17.78	10.17	10.02	
Turbidity	12.7	17.99	12.7	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time <u>UB 4:00 PM</u> Name KEUEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes ,
Cond (uS/cm @ 25°C)	1,000	16.65	1104	NO		Q	
Cond (uS/cm @ 25°C)	10,000	16.45	9890	NO		A	
DO (%)		19.65	93.1	NO		A	712.5 mm/H
D0 (mg/L)		19.65	8.49	NO		A	Check solubility table
pH4	pH 4	15.76	3.99	NO		A	8.5 mg/L
рН 7	pH 7	19.69	6.95	NO		A	С,
pH 10	pH 10	15.91	9.95	NO		A	
Turbidity	12.71	22.79	12.5	NO		A	
Turbidity						8	
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences	pg 2 of 4
Water Quality YSI 6920 Sonde Calibration – Daily Use	
Project: UARP WA RIVERINE FALL 2016	4
Unit ID: 451 6420	

Sampling Event Date(s): $\frac{\eta}{\eta} - \frac{\eta}{\eta}$

PRE-SAMPLING CALIBRATION Date and time 11 9 6:20 AM Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	22.23	1227	1000	
Cond (uS/cm @ 25°C)	10,000	22.24	8930	10,000	
DO (%)		22.25	93.9	93.7	712.9 mm/th
D0 (mg/L)*		22.25	8.16	8.15	Check solubility table*
pH4	pH4	22.19	4.11	4.00	8.1 mall
рН 7	pH 7	22.28	6.90	7.00	6
pH 10	pH 10	22.07	10.10	10.02	
Turbidity	12.7	22.52	11.3	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time 11 9 3:25PM Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	21.55	1107	NO		Q	
Cond (uS/cm @ 25°C)	10,000	21.92	9872	NO		A	
DO (%)		22.12	93.3	No		A	711.9 mm/Ha
D0 (mg/L)		22.12	8.12	NO		A	Check solubility table
pH4	pH 4	21.24	3.95	NO		A	BIMAL
рН 7	pH 7	21.55	6.91	NO		A	. 0, -
pH 10	pH 10	21.73	9.94	NO		A	
Turbidity	12.7	22.02	12.6	NO		A	
Turbidity		-					
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
рН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences

pg <u></u>*J* of <u></u>**4**</u> Water Quality YSI 6920 Sonde Calibration − Daily Use

Project: UARP WA RIVERINE FALL ZOIL

Unit ID: 451 6920

Sampling Event Date(s): 11 - 11 / LL

Date and time U 10 7:00 AM Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	21.23	1072	1000	
Cond (uS/cm @ 25°C)	10,000	21.38	9018	10,000	
DO (%)		21.27	93.0	93.8	712.6 mm/Hg
DO (mg/L)*		21.27	8.23	8.28	Check solubility table*
pH4	pH4	21.47	3.97	4.00	8.3 ma/L
рН 7	pH 7	21.51	6.96	7.00	
pH 10	pH 10	21.17	10.10	10.02	
Turbidity	12.7	21.37	14.4	12.7	
Turbidity					

POST-SAMPLING CALIBRATION CHECK Date and time 11 10 5:30 PM Name KELLEIGH CROWE

Date and time _	110 5	DO PPI Nal	ne receibt	CLOWE

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes
Cond (uS/cm @ 25°C)	1,000	21.41	1133	NO		Q	
Cond (uS/cm @ 25°C)	10,000	21.57		NO		A	
DO (%)		21.49	94.1	NO		A	711.9 mm/ttg
D0 (mg/L)		21.49	8.31	NO		A	Check solubility table
pH4	pH4	21.43	4.00	NO		A	8.2 mg/L
рН 7	pH 7	21.67	6.96	NO		A	0,
pH 10	pH 10	21.57	9.99	NO		A	
Turbidity	12.7	21.49	12.9	NO		A	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%
pН	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%



Stillwater Sciences Water Quality YSI 6920 Sonde Calibration – Daily Use	pg <u>4</u> of <u>4</u>
Project: UARP WQ RIVERINE FALL 2016	
Unit ID: 451 6920	
Sampling Event Date(s): $11/7 - 11/11$	

Date and time 11 11 6:10 AH Name KELLEIGH CROWE

Parameter	Std. Value	Std. Temp (°C)	Pre-Cal Value	Post-Cal Value	Notes
Cond (uS/cm @ 25°C)	1,000	20.91	1164	1000	
Cond (uS/cm @ 25°C)	10,000	20.63	8554	10,000	
DO (%)		20.56		93.6	711.6 au /Hg
DO (mg/L)*		20.56	8.45	8.40	Check solubility table*
pH4	pH4	21.01	4.03	4.00	8.4 mall
pH 7	рН 7	21.02	6.96	7.00	, and the second s
pH 10	pH 10	20.85	10.16	10.02	
Turbidity	12.7	20.82	12.6	12.7	
Turbidity					

 POST-SAMPLING CALIBRATION CHECK

 Date and time
 11/11
 8:00 PH
 Name
 KELLEIGH
 CROWE

Parameter	Std. Value	Std. Temp (°C)	Post- Sampling Value	Re-Cal Yes or No?	Post-Cal Value	MQO Code ¹	Notes ,
Cond (uS/cm @ 25°C)	1,000	21.49	1175	NO		Q	
Cond (uS/cm @ 25°C)	10,000	21.43	10,034	NO		A	
DO (%)		20.93		NO		A	761.4 mm/Ha
D0 (mg/L)		20.93	8.97	No		A	Check solubility table
pH4	pH 4	20.30	4.08	NO		A	B.9 mg/L
pH 7	pH 7	19.94	7.02	NO		A	7,=
pH 10	pH 10	20.18	10.11	No		A	
Turbidity	12.7	21.36	12.8	NO		A	
Turbidity							
¹ See Table 1							

Table 1: Measurement Quality Objectives - comparisons are between Post-sampling Value and Post-calibration Value

Parameter	Units	Accept	Qualify	Reject				
Dissolved oxygen	% saturation	≤ 5%	> 5% and ≤ 10%	> 10%				
Conductivity	uS/cm	≤ 5%	> 5% and ≤ 15%	> 15%				
pH	s.u.	≤ 0.2	> 0.2 and ≤ 0.5	> 0.5				
Turbidity	NTU	≤ 5%	> 5% and ≤ 10%	> 10%				



APPENDIX F Analytical Laboratory Bacteria Reports



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

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CALIFORNIA LABORATORY SERVICES

3249 Fitzgerald Road Rancho Cordova, CA 95742

June 27, 2016

CLS Work Order #: CZF0774 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 06/20/1613:32. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233



CALIFORNIA LABORATORY SERVICES

water Scienc							Project:					ic-T	Monitorin		1.14		19 10		
	'elegraph Ave., Suite 400 ey. CA 94705												5 W 0C#	S Work Order # CZF0774					
318y, CA 34	05					Floject IVI.	anager.	IVIA A III	Ser				00	<i>л</i> с т	8i				
C	LIF	ORNL/	LABORAT	ORY S	ERVIC	ES CHAIN	OF CU	STODY		CL	S ID.	NO.	<u>(ZF 0</u>	774	ł	_		(of	
	Report To:					Client Job Number 500.20 Task 0120.00				AN	ALYS	IS RI	EQUESTED	ED GEOTRACKER					
	Stillwater Sciences 2855 Telegraph Ave. Suite 400				Destination Laboratory Rancho Cordova				Fec	Feca	E. co			FRE	PORT	r	YES X NO		
		, CA 94				X CLS (916) 638-7301				alco	il co	li Qu		GL	GLOBAL ID.				
Project Manager Maia Singer maia@stillwatersci.com				 3249 Fitzgerald Road Rancho Cordova, CA 				Fecal coliform-15 Tube	Fecal coliform-20 Tube	coli Quanti-tray									
	Project Name SMUD In situ and Bac-T Monitoring			95742 www.californialab.com			PRESERVATIVES	n-15	1-20	ay		FI	FIELD CONDITIONS:						
Samp	ed By					OTHER				Tub	Tub								
	Job Description Monitor seasonal bacteria levels in UARP reaches.			-				e	Q										
MORI	in seas	undi Dacieria	i levels in UARA reactics	_					1310										
Site 1	Site Location UARP		-									TURNAROUND SPECIAL TIME IN DAYS INSTRUCTIONS							
DA	DATE TIME			SAMPLE FIE				CONTAINER						1	2	3	5		
			IDENTIFICA	2.98321	1D.	MATRIX	NO,	TYPE	•		_			Ľ	-	L.			
			BAC-12-I		-	Surface water		_	6	X		X		-		-	X		
			BAC-13-I			Surface water Surface water			6	X				+	-	-	X		
			BAC- 14-8			Surface water			6	X		X		+	-	-	X		
1/20	16 1	2:050	BAC-15-5	CR		Surface water			6	X	-	X		+	-	-	X		
_	-					Concentration and the			6		_	-		-	-	-	X		
	_					Surface water			6		_	-	+++	-	-	-	X	A MANAGARA STOL	
						Surface water			6			_					X	INVOICE TO:	
						Surface water			6								X	Stillwater Sciences	
						Surface water			6								X	Same as above	
						Surface water			6								X		
						Surface water			6								X	Project No. 500.20 Tas 0120.00	
_						Surface water			6				•	-	1	1	X	QUOTE#	
SUSF	ECTE	D CONST	TUENTS							SAM	PLE RE	TENT	ION TIME	PR	ESEF	EVAT		1) HCL (3) = COLD 2) HNO ₁ (4)= H2SO4	
REL	RELINQUISHED BY (Signature) PRINT NAM			E/COMPANY DATE/TIME					RECEIVED BY (Signature)						PRINT NAME/COMPANY				
4	ur	10	al)	KEL	EIGH CI	ROWE	6	120/16											
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	-	D BY:	T Solla	-	s 🗆	OTHER		600	5				R BILL#						

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742

www.californialab.com 916-638-7301

Fax: 916-638-4510



Page 2 of 3								06/27/1	610:04
Stillwater Sciences 2855 Telegraph Ave., Suite 400		Design	Project:		n situ and Bask 0120.00	ac-T Monitori	ng LS Work Orde	r #. C7E0774	
Berkeley, CA 94705		5		Maia Sing			COC #:	1 #. CZP0//4	
	Microbiologic	2	0	U		Methods			
	Result	Reporting	Units	Dilution	Batch	Durand		Method	Notes
Analyte		Limit		1000000000000	Barch	Prepared	Analyzed	Method	Notes
BAC-12-IHR (CZF0774-01) Water	Sampled: 06/20/16 10:30	Received: 06	/20/16 13:	.32					
E. Coli	1.0	1.0	MPN/100) 1	CZ04412	06/20/16	06/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04417		06/23/16	SM 9221	
BAC-13-IHR (CZF0774-02) Water	Sampled: 06/20/16 10:45	Received: 06	/20/16 13:	32					
E. Coli	<1	1.0	MPN/100 mL) 1	CZ04412	06/20/16	06/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ04417	"	06/23/16	SM 9221	
BAC-14-BCR (CZF0774-03) Water	Sampled: 06/20/16 10:22	Received: 0	5/20/16 13	:32					
E. Coli	<1	1.0	MPN/100 mL) 1	CZ04412	06/20/16	06/21/16	SM9223	
Fecal Coliforms	2.0	1.8	тн. "	"	CZ04417	"	06/23/16	SM 9221	
BAC-15-SCR (CZF0774-04) Water	Sampled: 06/20/16 12:05	Received: 06	5/20/16 13	:32					
E. Coli	<1	1.0	MPN/100 mL) 1	CZ04412	06/20/16	06/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04417	"	06/23/16	SM 9221	

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742

www.californialab.com 916-638-7301



Page 3 c	of 3		06/27/16 10:04
2855 Te	er Sciences Jegraph Ave., Suite 400 y, CA 94705	Project: SMUD In situ and F Project Number: 500.20 / Task 0120.00 Project Manager: Maia Singer	
		Notes and Definitions	
BT-4a	<1.8		
3T-4	<1		
DET	Analyte DETECTED		
ND	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit when specified)	
VR.	Not Reported		
lry	Sample results reported on a dry weight basi	s	
RPD .	Relative Percent Difference		

CA DOHS ELAP Accreditation/Registration Number 1233

3249 Fitzgerald Road Rancho Cordova, CA 95742

www.californialab.com 916-638-7301



3249 Fitzgerald Road Rancho Cordova, CA 95742

June 28, 2016

CLS Work Order #: CZF0863 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 06/21/16 13:46. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



llwater So 55 Tel egr		, Suite 400		Proj		roject: SM mber: 500.2					ac-1	Monitori C		Noi	кO	rder	#: CZF0863
keley, C	A 94705	21		Proje	ect Ma	nager: Maia	. Sin	ger				ç	COC	#:			
CALI	FORNL	A LABORATO	DRY SERVI	CES CHAIN	OF C	USTODY		CL	S ID.	. NO)	CRF	280	63	3		(of
		Report To:		Client 500.20	Job Nur Task 01	mber 20.00		AN	ALYS	SIS	REQ	UESTED	GEO	OTR/	CKE	R	
Stillwat 2855 Te		ces Ave. Suite 400	1) ¹⁶		tion Labo tho Cord			Fecal coliform-15 Tube	Fecal coliform-20 Tube	1 1.40	1		EDI	[,] REI	PORT		YES X NO
Berkele	y, CA 94	1705	2	× CLS	(916)	638-7301		alco	l co	von Quant-uay			GLO	OBAI	. ID.		
Project Mar		5		3249 Banc	Fitzger ho Cord	ald Road lova, CA	-	life	ITO	ante							
Maia S Project Nan		iia@stillwatersci.c	om	9574	2		RE	m	rm-	uay			FIE	LDC	ONDI	TIONS	2
SMUD	In situ a	nd Bac-T Monitor	ing	www.cal	ifornial	ab.com	SER	15	07								
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Job Descrip							PRESERVATIVES	õ	e	8							
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0/21/14	12:0000	BAC-8-UV	R	Surface water			6		2	_	4					X	
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1/21/16	11:16AH	BAC- 10-01	IR	Surface water			6		2		<	-		-	2	X	INVOICE TO:
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Page 2 of 3								06/28/10	515:45
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5			ask 0120.00		ng LS Work Orde :OC #:	r #: CZF0863	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-5-GCR (CZF0863-01) Water	Sampled: 06/21/16 10:29	Received: 06	/21/16 13:	46					
E. Coli	3.1	1.0	MPN/100) 1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ04466	06/21/16	06/24/16	SM 9221	
BAC-6-GCR (CZF0863-02) Water	Sampled: 06/21/16 10:48	Received: 06	/21/16 13:	46					
E. Coli	<1	1.0	MPN/100	1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04466	06/21/16	06/24/16	SM 9221	
BAC-7-UVR (CZF0863-03) Water	Sampled: 06/21/16 12:05	Received: 06	/21/16 13:	46					
E. Coli	8.6	1.0	MPN/100) 1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	13	1.8	mL "	n	CZ04465	06/21/16	06/24/16	SM 9221	
BAC-8-UVR (CZF0863-04) Water	Sampled: 06/21/16 12:00	Received: 06	/21/16 13:	46					
E. Coli	<1	1.0	MPN/100	1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04465	06/21/16	06/24/16	SM 9221	
BAC-9-UVR (CZF0863-05) Water	Sampled: 06/21/16 11:00	Received: 06	/21/16 13:	46					
E. Coli	<1	1.0	MPN/100	1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	<i>n</i>	CZ04465	06/21/16	06/24/16	SM 9221	
BAC-10-UVR (CZF0863-06) Water	Sampled: 06/21/16 11:16	Received: 0	6/21/16 13	:46					
E. Coli	1.0	1.0	MPN/100) 1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	"	CZ04465	06/21/16	06/24/16	SM 9221	
BAC-11-JR (CZF0863-07) Water	Sampled: 06/21/16 10:30	Received: 06/2	21/16 13:4	6					
E. Coli	5.3	1.0	MPN/100) 1	CZ04464	06/21/16	06/22/16	SM9223	
Fecal Coliforms	7.8	1.8	mL "	71	CZ04465	06/21/16	06/24/16	SM 9221	

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2855 Tel	er Sciences legraph Ave., Suite 400 7, CA 94705	Project: Project Number: Project Manager:	500.20 / Task 0120.00	Monitoring CLS Work Order #: CZF0863 COC #:
		Notes and Defin	itions	
T-4a	<1.8			
Г-4	<1			
T	Analyte DETECTED			
)	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit v	when specified)	
ર	Not Reported			
у	Sample results reported on a dry weight bas	s		
PD	Relative Percent Difference			

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 05, 2016

CLS Work Order #: CZF1118 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 06/27/1616:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



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			Report To:	45		Job Num Task 012			AN	ALYSI	S REQ	UESTED	GEO	TRACK	ER	
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	Berkele	y, CA 94	4705			(916)			100	0	1Q	122	GLO	BALID		
		Singer ma	iia@stillwatersci.com		3249 Ranc 95742	Fitzgera ho Corde 2	ld Road wa, CA	PR	liform	liform	E, coll Quanti-tray			0.000	DITION	0.
	Project Na SMUE Sampled B) In situ a	and Bac-T Monitoring		www.eal		b.com	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube			LICE	DC03	UTTON	3
	Job Descri Monitor se	ption asonal bacteri	in levels in UARP reaches.			ск ? ¹		TIVES	be	90						
	Site Locati	on UARP												RNAR ME IN		SPECIAL INSTRUCTIONS
	New York	anosed	SAMPLE	FIELD	x	CON	TAINER						1			
	DATE	TIME	IDENTIFICATION	1D.	MATRIX	NO.	ТУРЕ	Y					1	2 3	5	
	6/27/16	2:450	BAC-12-IHR		Surface water			6	X		X				X	
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	1/27/16	1:30PM	BAC-15-SCR	_	Surface water			6	X		X	no Constants		100	X	
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					Surface water			6	- 2	1.0					X	Stillwater Sciences
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					Surface water	20		6			1	a Carace			x	
	-				Surface water			6							x	Project No. 500.20 Tax 0120.00
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	SUSPECT	ED CONSTI	ITUENTS	_			<u>k</u>		SAM	PLE REI	ENTION	TIME	PRE	SERVA		(I) HCL (3) = COLD
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Page 2 of 3								07/05/1	6 12:01
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5			ask 0120.00		ng I LS Work Orde COC #:	r #: CZF1118	
	Microbiologic	al Parame	ters by	APHA	Standaro	l Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-12-IHR (CZF1118-01) Water	Sampled: 06/27/16 14:45	Received: 06	/27/16 16:	30					
E. Coli	1.0	1.0	MPN/100) 1	CZ04625	06/27/16	06/28/16	SM9223	
Fecal Coliforms	2.0	1.8	mL "	и	CZ04626	06/27/16	06/30/16	SM 9221	
BAC-13-IHR (CZF1118-02) Water	Sampled: 06/27/16 14:30	Received: 06	/27/16 16:	30					
E. Coli	3.1	1.0	MPN/100 mL) 1	CZ04625	06/27/16	06/28/16	SM9223	
Fecal Coliforms	2.0	1.8	"	"	CZ04626	06/27/16	06/30/16	SM 9221	
BAC-14-BCR (CZF1118-03) Water	Sampled: 06/27/16 12:30	Received: 00	5/27/16 16	:30					
E. Coli	2.0	1.0	MPN/100) 1	CZ04625	06/27/16	06/28/16	SM9223	
Fecal Coliforms	7.8	1.8	mL "		CZ04626	06/27/16	06/30/16	SM 9221	
BAC-15-SCR (CZF1118-04) Water	Sampled: 06/27/16 13:30	Received: 06	6/27/16 16	:30					
E. Coli	1.0	1.0	MPN/100) 1	CZ04625	06/27/16	06/28/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	ж	CZ04626	06/27/16	06/30/16	SM 9221	

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Stillwat	er Sciences	Project:	SMUD In situ and Bac-T M	Aonitoring
	elegraph Ave., Suite 400		500.20 / Task 0120.00	CLS Work Order #: CZF1118
Berkele	y, CA 94705	Project Manager:	Maia Singer	COC #:
		Notes and Defin	itions	
Т-4	<1.8			
Т	Analyte DETECTED			
	Analyte NOT DETECTED at or above the r	porting limit (or method detection limit	when specified)	
	Not Reported			
	Sample results reported on a dry weight bas	s		
)	Relative Percent Difference			

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 06, 2016

CLS Work Order #: CZF1160 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 06/28/16 13:38. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



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6 Telegr keley, C.	aph Ave., A 94705	, Suite 40	0			Project Nu Project Ma)120	.00		CLS		k On	ler#:	CZF1160		
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17	and the second s		Report To:			Client 500.20	t Job Numb Tusk 0120,	ier RØ		AN/	LYSE	S REQU	ESTED	GEOI	RACK	ER			
		ter Scien elegraph	ces Ave. Suite 400			Destinat	tion Labora cho Cordov	itory	PRESERVATIVES	Fee	Fecal coliform-20 Tube	E. col		EDF1	REPOR	r	YES X NO		
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	Maia S Project Na		aia@stillwatersci.c	om		9574	2		R	Ĭ	100-	tray	1 1	FIELD	CONI	DITION			
			and Bac-T Monito	ring		www.eal	lifornialal	b.com ·	SEF	5	20	8				CONDITIONS:			
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	6/28/11.	10:05	8A-8-11			Surface water			6		X	X			10 22	x	(<i>i</i>		
	W28/11	11:20	BAC-9-UV		30	Surface water		1	6		X	X				X			
	628/16	10:45	BAC-10-0	UR		Surface water			6	_	X	X			-	x	NUMBER TO		
	6 28/16	11:45	BAC-11-J	2	_	Surface water			6		X	X		_	_	x	INVOICE TO: Stillwater Sciences		
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						Surface water Surface water		-	6	-	-		-	-	_	X			
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	\$1150277	ED CONST	THENIS			Surface water	<u>.</u>	-	6	SAM	21.2.817	UNFION 1		PRES	ERVAT	X IVES (QUOTER B-HCL (3) = COLD		
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Page 2 of 3								07/06/16	13:50
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5	Project: Number: Manager:	500.20 / T	ask 0120.00		ng LS Work Orde OC #:	r #: CZF1160	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-5-GCR (CZF1160-01) Water	Sampled: 06/28/16 09:30	Received: 06	/28/16 13:3	38					
E. Coli	18.5	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	17	1.8	mL "	"	CZ04655		07/01/16	SM 9221	
BAC-6-GCR (CZF1160-02) Water	Sampled: 06/28/16 09:40	Received: 06	/28/16 13::	38					
E. Coli	35.9	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	33	1.8	mL "		CZ04655		07/01/16	SM 9221	
BAC-7-UVR (CZF1160-03) Water	Sampled: 06/28/16 10:25	Received: 06	/28/16 13:3	38					
E. Coli	<1	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04656	11	07/01/16	SM 9221	
BAC-8-UVR (CZF1160-04) Water	Sampled: 06/28/16 10:05	Received: 06	/28/16 13:3	38					
E. Coli	9.7	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04656	"	07/01/16	SM 9221	
BAC-9-UVR (CZF1160-05) Water	Sampled: 06/28/16 11:20	Received: 06	/28/16 13:3	38					
E. Coli	1.0	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	п	CZ04656	"	07/01/16	SM 9221	
BAC-10-UVR (CZF1160-06) Water	Sampled: 06/28/16 10:45	Received: 0	6/28/16 13	:38					
E. Coli	3.0	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ04656	н	07/01/16	SM 9221	
BAC-11-JR (CZF1160-07) Water	Sampled: 06/28/16 11:45	Received: 06/2	28/16 13:38	8					
E. Coli	6.2	1.0	MPN/100	1	CZ04652	06/28/16	06/29/16	SM9223	
Fecal Coliforms	4.0	1.8	mL "	"	CZ04656	п.	07/01/16	SM 9221	

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ces Ave., Suite 400 4705	Project: Project Number: Project Manager: Notes and Defin	500.20 / Task 0120.00 Maia Singer	Monitoring CLS Work Order #: CZF1160 COC #:
3	Notes and Defin	litions	
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yte NOT DETECTED at or above the reporting limit ((or method detection limit v	when specified)	
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ple results reported on a dry weight basis			
	e results reported on a dry weight basis	e results reported on a dry weight basis	• myshadan

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 12, 2016

CLS Work Order #: CZG0101 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/05/1615:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



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	ciences aph Ave., A 94705	Suite 40	0			Project Nu Project Ma			ask			ΤM			k C)rde	er #:	CZG0101
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			Report To	:			Job Numb Task 0120.		Γ	AN/	ALYSI	S REC	UESTED	GEO	TRA	CKE	R	
	2855 Te	er Seien elegraph y, CA 94	Ave. Suite 400			Destinat Ranc	ion Labora ho Cordov (916) 6	lory a		Fecal	Fecal c	E, coli Q	4	EDF		ORT		YES X NO
	Project Ma	nager inger <u>m</u> e	aia@stillwaters	ci.com		3249 Ranci 9574	Fitzgerak ho Cordo 2	l Road /a, CA	PRESERVATIVES	oliform-	Fecal coliform-20 Tuhe	E. coli Quanti-tray				620 	TIONS	
	SMUD Sampled B	In situ a	and Bac-T Mon	itoring			ifornialal ER	i,eom	SERVATIV	15 Tube	20 Tuhe			00-63				
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	DATE	TIME	SAMP IDENTIFIC		FIELD D.	MATRIX	CON NO.	TAINER TYPE	T					1	2	3	5	
	7/5/16	10:30	PK-15-	SCR		Surface water		1	6	x	1-1200	x					x	
	7/5/16	11:35	BAC - 14 -	BCR		Surface water			6	x	0.16	X					х	
	7/5/16	13:15	BAC-13	- IHR		Surface water		£	6	x		x					x	
	7/5/16	13:30	BAC-12 -	THR		Surface water			6	X		x			_		x	
	1.00.000	1000-10-10				Surface water		1	6				381110			-	Х	
		P-11	887			Surface water	61 F.S	S	6		1.1.1.1.1.1		-				x	
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			Carlos and a second			Surface water			6		_						X	Stillwater Sciences
		1 03	2			Surface water			6						_	_	X [®]	Same as above
						Surface water			6							_	X	
	1					Surface water		1	6								х	Project No. 500.20 Te- 0120.00
	1					Surface water			6								х	QUOTEA
	SUSPECT	ED CONST	TIMENTS		·					SAM	PLE RET	ENTIO	N TIME	PRE	SER	VATP	VES (1) HCL (J) = COLD () HNO ₁ (4)=112SO4
	RELINO	ISHED BY (Signaure)	1	PRINT NAM	ECOMPANY	1	ATE/TIME	1	_	RECEI	VED B	(Signature)	19957				T NAME/COMPANY
<	Sh.	. 2	- ON	Kon	64 0			15/16	1		10000							
	The	tet	Jac)			R SCIENC		S-BOPH					-					
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$CALIFORNIA \ LABORATORY \ Services$

Page 2 of 3								07/12/1	6 12:39
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		,			ask 0120.00		ng LS Work Orde :OC #:	r #: CZG0101	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-15-SCR (CZG0101-01) Water	Sampled: 07/05/16 10:30	Received: 0'	7/05/16 15	:30					
E. Coli	12.0	1.0	MPN/100 mL	1	CZ04828	07/05/16	07/06/16	SM9223	
Fecal Coliforms	17	1.8	"	"	CZ04831	07/05/16	07/08/16	SM 9221	
BAC-14-BCR (CZG0101-02) Water	Sampled: 07/05/16 11:35	Received: 0	7/05/16 15	:30					
E. Coli	<1	1.0	MPN/100 mL	1	CZ04828	07/05/16	07/06/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ04831	07/05/16	07/08/16	SM 9221	
BAC-13-IHR (CZG0101-03) Water	Sampled: 07/05/16 13:15	Received: 07	/05/16 15	30					
E. Coli	<1	1.0	MPN/100 mL	1	CZ04828	07/05/16	07/06/16	SM9223	
Fecal Coliforms	2.0	1.8	"	"	CZ04831	07/05/16	07/08/16	SM 9221	
BAC-12-IHR (CZG0101-04) Water	Sampled: 07/05/16 13:30	Received: 07	//05/16 15	30					
E. Coli	<1	1.0	MPN/100 mL	1	CZ04828	07/05/16	07/06/16	SM9223	
Fecal Coliforms	4.5	1.8	"	10.	CZ04831	07/05/16	07/08/16	SM 9221	

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age 3 o	f 3 r Sciences	Project:	SMUD In situ and Bac-T M	07/12/16 12:39
2855 Tel	egraph Ave., Suite 400 r, CA 94705		500.20 / Task 0120.00	CLS Work Order #: CZG0101 COC #:
		Notes and Defin	itions	
3T-4a	<1.8			
T-4	<1			
Ŧ	Analyte DETECTED			
D	Analyte NOT DETECTED at or above the rep	porting limit (or method detection limit v	when specified)	
R	Not Reported			
У	Sample results reported on a dry weight basis	i.		
PD	Relative Percent Difference			

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 13, 2016

CLS Work Order #: CZG0162 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/06/16 13:20. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



$\mathbf{C}_{\text{ALIFORNIA}} \mathbf{L}_{\text{ABORATORY}} \mathbf{S}_{\text{ERVICES}}$

68.50°°.88	ciences raph Ave., A 94705	Suite 40	0		Project Nu Project Mar	mber: 1		ask (T M			rk (Drd	er#:	CZG0162
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			Report To:			Job Numb Task 0120.			AN	ALYSI	S REQ	UESTED	GE	OTR/	скв	R	
		ter Seien eleeranh	ces Ave. Suite 400			ion Labora ho Cordov			Fee	Fec	E. 00		ED	FREI	ORT		YES X NO
	Berkele	ey, CA 94				(916) 6. Fitzgerald		1000	al col	al coli	E. coli Quanti-tray		GL.	OBAI	. ID.		
		Singer ma	ia@stillwatersci.com			ho Cordo		PRI	form	form	otl-tra		L				
	Project Na SMUE Sampled B) In situ a	nd Bac-T Monitoring		www.cal		0.0001	PRESERVATIVES	Fecal coliform-15 Tube	Fecal coliform-20 Tube	Ň		FIE	LDC	OND	ITIONS	New York Control of Co
	Job Descri Monitor se	ption asonal bacter	a levels in UARP reaches					VES	e	114380							
	Site Lucation UARP													URN. IME			SPECIAL INSTRUCTIONS
	DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CON NO.	FAINER TYPE	Y	8				1	2	3	5	
	7/6/16	9:55 AH	BAC-5-GCR		Surface water			6	X		X					x	
	7/6/16	ID'IFAN	BAC-6-GCR		Surface water	SARELL SE	10.21161	6	X	1	X					X	
	7/6/16	HADIP	BAC-7-UNR	and an	Surface water	11 · · · · ·		6		×	X				12	x	(A) >>
	7616	1:3000	BAC- 8- UVR	2381994-56	Surface water		1	6		X	X		1		1.55	x	
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			BAC-10-UVR		Surface water			6		×	X					х	
			BAC-11-JR		Surface water			6	0	X	X					x	INVOICE TO:
	-				Surface water			6			11					x	Stillwater Sciences
					Surface water	-		6								x⊕	Same as above
					Surface water			6								x	Society and
					Surface water			6								x	Project No. 500.20 Task 0120.00
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Page 2 of 3								07/13/16	15:14
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705			Project: t Number: Manager:	500.20 / ٦	ask 0120.00		ng L S Work Orde OC #:	r #: CZG0162	
	Microbiologic	al Parame	eters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-5-GCR (CZG0162-01) Water	Sampled: 07/06/16 09:55	Received: 07	7/06/16 13:	20					
E. Coli	<1	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	11	1.8	mL "	"	CZ04853	"	07/09/16	SM 9221	
BAC-6-GCR (CZG0162-02) Water	Sampled: 07/06/16 10:15	Received: 07	7/06/16 13:	20					
E. Coli	10.9	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	n	CZ04853	"	07/09/16	SM 9221	
BAC-7-UVR (CZG0162-03) Water	Sampled: 07/06/16 09:10	Received: 07	/06/16 13:	20					
E. Coli	<1	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	n	CZ04854	"	07/09/16	SM 9221	
BAC-8-UVR (CZG0162-04) Water	Sampled: 07/06/16 09:30	Received: 07	//06/16 13:	20					
E. Coli	<1	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	10	CZ04854		07/09/16	SM 9221	
BAC-9-UVR (CZG0162-05) Water	Sampled: 07/06/16 11:05	Received: 07	//06/16 13:	20					
E. Coli	1.0	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	2.0	1.8	mL "		CZ04854	"	07/09/16	SM 9221	
BAC-10-UVR (CZG0162-06) Water	Sampled: 07/06/16 10:35	Received: 0	07/06/16 13	:20					
E. Coli	<1	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04854	"	07/09/16	SM 9221	
BAC-11-JR (CZG0162-07) Water	Sampled: 07/06/16 11:35	Received: 07/	06/16 13:2	0					
E. Coli	21.6	1.0	MPN/100	1	CZ04845	07/06/16	07/07/16	SM9223	
Fecal Coliforms	23	1.8	mL "		CZ04854		07/09/16	SM 9221	

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Fax: 916-638-4510



	f 3 rr Sciences	Project:		
	legraph Ave., Suite 400 7, CA 94705	Project Number: Project Manager:	500.20 / Task 0120.00 Maia Singer	CLS Work Order #: CZG0162 COC #:
	0	Notes and Defin	itions	
T-4a	<1.8			
Г-4	<1			
T	Analyte DETECTED			
0	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit v	when specified)	
R	Not Reported			
у	Sample results reported on a dry weight bas	s		
D	Relative Percent Difference			

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 18, 2016

CLS Work Order #: CZG0423 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/11/1615:20. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



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er Sciences legraph Ave., y, CA 94705	Suite 40	ō			Project Nu Project Ma	mber: 5	00.20 / T	ask (ΤM	onitoring CLS COC		rk (Ord	er #:	CZG0423
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		Report To:				Job Numbe Task 0120.0			AN.	ALYSE	s REG	QUESTED	GEO)TR/	CKE	R	
2855 T	ter Seiene elegraph ey, CA 94	Ave. Suite 400			Destinat Rane	ion Laborat ho Cordova	ory	1	Fecal	Fecal	E. coll (17356		'ORT		YES X NO
Project Maia S	mager Singer ma	iia@stillwatersci.	com		3249	(916) 63 Fitzgerald no Cordov 2	Road	PR	coliform	oliform	coll Quanti-tray		GLOBAL ID. FIELD CONDITIONS:				
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Job Descri Monitor se	ption asonal bacteri	ia levels in UARP reaches	ŝ.					IVES	ň	ľ							
Site Locat	Site Location UARP												Ţ	URN IME	AROI IN D.	UND AYS	SPECIAL INSTRUCTIONS
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111111	12:00	BAC - 14 - B	CR		Surface water			6	×		Y		1	2	3 30	x	0000
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		1		8	Surface water			6				un en la				X	
		1			Surface water	8 - I		6				1.1		1		x	
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	1 2				Surface water	_		6								x	Stillwater Sciences
					Surface water	_		6	_			-	_	-	_	X®	Same as above
		0		-	Surface water			6		_				1-1		X	Builder No. 400 Million
					Surface water			6								X	Project No. 500.20 Tax 0120.00
10000					Surface water			6						alamia		X	QUOTER
SUSPECI	ED CONSTI	TUENTS			v			1	SAM	PLERET	ENTR	IN TIME	PRI	SER	VATI	VES (1 (2) HCL (3) = COLD () HNO, (4)= H2SO4
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Al	un	A		CE H,-	C SCIENCE		11/16	6		20115		0.1-22/222		-			
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Page 2 of 3								07/18/1	6 11:46
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5			ask 0120.00		ng L S Work Orde OC #:	r #: CZG0423	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-12-IHR (CZG0423-01) Water	Sampled: 07/11/16 13:20	Received: 07	7/11/16 15	:20					
E. Coli	1.0	1.0	MPN/100	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ04969	н	07/14/16	SM 9221	
BAC-13-IHR (CZG0423-02) Water	Sampled: 07/11/16 13:35	Received: 07	7/11/16 15	:20					
E. Coli	<1	1.0	MPN/100	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	"	CZ04969	н	07/14/16	SM 9221	
BAC-14-BCR (CZG0423-03) Water	Sampled: 07/11/16 12:00	Received: 0	7/11/16 15	:20					
E. Coli	6.3	1.0	MPN/100	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	94	1.8	mL "	"	CZ04969	н	07/14/16	SM 9221	
BAC-15-SCR (CZG0423-04) Water	Sampled: 07/11/16 10:50	Received: 0'	7/11/16 15	:20					
E. Coli	2.0	1.0	MPN/100	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	49	1.8	mL "	п	CZ04969		07/14/16	SM 9221	

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age 3 o		vo v v vertorio	return tala ancora anata di	07/18/16 11:46			
2855 Tel	r Sciences egraph Ave., Suite 400 ; CA 94705	Project Number: 500.20	Project: SMUD In situ and Bac-T Monito Project Number: 500.20 / Task 0120.00 Project Manager: Maia Singer				
		Notes and Definitions					
3T-4a	<1.8						
T-4	<1						
ET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit when spec	ified)				
R	Not Reported						
У	Sample results reported on a dry weight basi	s					
PD	Relative Percent Difference						

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 19, 2016

CLS Work Order #: CZG0467 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/12/16 13:45. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



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1990 - T U	iences aph Ave., A 94705	Suite 40	0			mber:	SMUD I: 500.20 / Ta Maia Sing	ask O			T Mo			rk Oı	der#	: CZG0467	
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		17.	Report To:			Job Nun Task 012			AN/	ALYSE	S REQ	UESTED	GD	OTRAC	KER		
		ter Seien elegraph	ces Ave. Suite 400		Destinat	tion Labo	ratory		Fee	Feca	р c	TT	EDI	F REPO	RT	YES X NO	
	Berkele	ey, CA 94	4705	1 - 11 ¹ / A.S.	× CLS	(916)	638-7301	1 3	alco	l col	li Que		GL	OBAL I	D.		
		inger me	ua@stillwatersci.co	<u>m</u>		ho Cord	ld Road ova, CA	PR	liform	iform	E. coli Quanti-tray						
	Project Na SMUE Sampled B	In situ e	md Bac-T Monitori	ng	www.cal	ifornial:	ab.com	PRESERVATIVES	-15 Tub	Fecal coliform-20 Tube	~		FIE	LDCO	DITION	15:	
	Job Descrij Monitor se	ption asonal bacter	ia levels in UARP reaches					IVES	ř	0							
	Site Locati	on UARP											1	TURNAROUND TIME IN DAYS		SPECIAL INSTRUCTIONS	
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			18AC-6-6CP		Surface water		1	6		X	1		-	-	x		
			BAC-B-UVE		Surface water	-	1	6		X	1		-		x		
			BAC- 9- UVE		Surface water		-	6	-	1	X				x		
			BAC- 10-UVI		Surface water	10 - FE	1	6	-	X	X				x		
			18AC-11-JR		Surface water		1	6			X				x	INVOICE TO:	
	hicks	ic PONT			Surface water		-	6		-			T		X	Stillwater Sciences	
					Surface water	-		6							x	Same as above	
					Surface water			6							x		
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Stillwater Sciences	Project: SMUD In sit	u and Bac-T Monitoring
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task (0120.00 CLS Work Order #: CZG0423
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-12-IHR (CZG0423-01) Water	Sampled: 07/11/16 13:20	Received: 07	7/11/16 15	:20					
E. Coli	1.0	1.0	MPN/100 mL	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ04969		07/14/16	SM 9221	
BAC-13-IHR (CZG0423-02) Water	Sampled: 07/11/16 13:35	Received: 07	7/11/16 15:	:20					
E. Coli	<1	1.0	MPN/100 mL	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	4.5	1.8	, ,	"	CZ04969		07/14/16	SM 9221	
BAC-14-BCR (CZG0423-03) Water	Sampled: 07/11/16 12:00	Received: 0	7/11/16 15	:20					
E. Coli	6.3	1.0	MPN/100 mL	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	94	1.8		"	CZ04969		07/14/16	SM 9221	
BAC-15-SCR (CZG0423-04) Water	Sampled: 07/11/16 10:50	Received: 0'	7/11/16 15	:20					
E. Coli	2.0	1.0	MPN/100 mL	1	CZ04967	07/11/16	07/12/16	SM9223	
Fecal Coliforms	49	1.8	"	"	CZ04969		07/14/16	SM 9221	

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age 3 o		Vir 2 3 Vertrans	return tala ancora anata di	07/18/16 11:46			
2855 Tel	r Sciences egraph Ave., Suite 400 ; CA 94705	Project Number: 500.20	Project: SMUD In situ and Bac-T Monito Project Number: 500.20 / Task 0120.00 Project Manager: Maia Singer				
		Notes and Definitions					
3T-4a	<1.8						
T-4	<1						
ET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit when spec	ified)				
R	Not Reported						
У	Sample results reported on a dry weight basi	s					
PD	Relative Percent Difference						

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 19, 2016

CLS Work Order #: CZG0467 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/12/16 13:45. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



$\mathbf{C}_{\text{ALIFORNIA}} \mathbf{L}_{\text{ABORATORY}} \mathbf{S}_{\text{ERVICES}}$

ater Sciences Felegraph Ave ley, CA 94705	Project: SMUD In situ an Project Number: 500.20 / Task 0120 Project Manager: Maia Singer															
CAL	IFORNI	A LABORATO	DRY SERVIC	ES CHAIN	OF CL	STODY		CLS	5 1D, 1	vo, <u>C</u>	2001	46	1.	_	10	(of
100	71	Report To:	Client Job Number 500.20 Task 0120.00				ANALYSIS REQUESTED					GEOTRACKER				
	Stillwater Sciences 2855 Telegraph Ave. Suite 400				Destination Laboratory Rancho Cordova				Feca	ti i		EDF REPORT YES X NO				
Berke	ley, CA 9	4705	X CLS	(916)	638-7301	1	alc	alco	0	GLO	DBA	, ID.				
	Singer ma	aia@stillwatersci.c	3249 Fitzgerald Road Rancho Cordova, CA 95742			PRESERVATIVES	Fecal coliform-15 Tube	hiform	E. coli Quanti-tray		FIELD CONDITIONS:					
SMU	Project Name SMUD In situ and Bac-T Monitoring Sampled By				www.californialab.com			-15 Tu	Fecal coliform-20 Tube			HELDCONDITIONS:				
Job Desc Monitor		ia levels in UARP teaches.	UARP teaches						ি							
Site Loci	tion UARP									TURNAROUND SPECIAL TIME IN DAYS INSTRUCTIONS				SPECIAL INSTRUCTIONS		
DATE	TIME	SAMPLE IDENTIFICATI	ON FIELD	MATRIX	CO: NO.	CONTAINER	v					1	2	3	5	
7/12/1	9:450	BAC-5-6C	2	Surface water			6	X		X	10-11-11				x	
		BAC- 6-GCS		Surface water		18	6	×		X	100			1	X	
HIZ!	9:00 AL	BAC-7-01	τ	Surface water			6		X	X					x	
		BAC-B-UVA		Surface water			6		X	X					x	
blizh	11:3044	BAC- 9- UVI	2	Surface water			6	-	X	X			i I		X	
7/12/1	IL : COAP	BAC-10-UN	R	Surface water	10 - E - S		6		X	X					x	
		BAC-11-JR		Surface water			6		X	X				1	x	INVOICE TO:
7.571			2	Surface water			6						1		X	Stillwater Sciences
				Surface water			6								X [®]	Same as above
				Surface water			6								x	
				Surface water			6								x	Project No. 500.20 Tax 0120.00
(See and product of				Surface water			6								x	QUOTER
SUSPEC	TED CONST	TIVENIS					SAMI	PLERET	ENTION	TIME	PRE	SER	VATI	VES (I (2	() HCL (3) ~ COLD () HNO, (4)= H2SO4	
RELINO	UISHED BY	Signature)	E/COMPANY		DATE/TIME	8		RECEP	VED BY (Signature)	-	2.22		PRIM	IT NAME/COMPANY	
(Yaa	\leq	in)	KELLEIGH C	ROWE		12/16	č.					3/10/28				
1	VEDATLA	BBY: Challer	Stiquete			1345	CON	NDITI-	ons/cr	MMENT	S:		-7	5.6	5	
Guece	PED BY:	and phone	DATE/TIME: 7-12 7 10 7345 C					CONDITIONSCOMMENTS: (0 6)								

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Page 2 of 3								07/19/16	12:42
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705			Project: Number: Manager:	500.20 / T	ask 0120.00		ng L S Work Orde 'OC #:	r #: CZG0467	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-5-GCR (CZG0467-01) Water	Sampled: 07/12/16 09:45	Received: 07	/12/16 13:	45					
E. Coli	2.0	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	2.0	1.8	mL "	"	CZ05012	07/12/16	07/15/16	SM 9221	
BAC-6-GCR (CZG0467-02) Water	Sampled: 07/12/16 10:40	Received: 07	/12/16 13:	45					
E. Coli	5.2	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	"	CZ05012	07/12/16	07/15/16	SM 9221	
BAC-7-UVR (CZG0467-03) Water	Sampled: 07/12/16 09:00	Received: 07	/12/16 13:	45					
E. Coli	<1	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ05013	07/12/16	07/15/16	SM 9221	
BAC-8-UVR (CZG0467-04) Water	Sampled: 07/12/16 09:20	Received: 07	/12/16 13:	45					
E. Coli	<1	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	п	CZ05013	07/12/16	07/15/16	SM 9221	
BAC-9-UVR (CZG0467-05) Water	Sampled: 07/12/16 11:30	Received: 07	/12/16 13:	45					
E. Coli	2.0	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	n	CZ05013	07/12/16	07/15/16	SM 9221	
BAC-10-UVR (CZG0467-06) Water	Sampled: 07/12/16 11:00	Received: 0	7/12/16 13	:45					
E. Coli	1.0	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ05013	07/12/16	07/15/16	SM 9221	
BAC-11-JR (CZG0467-07) Water	Sampled: 07/12/16 11:50	Received: 07/	12/16 13:4	5					
E. Coli	21.6	1.0	MPN/100	1	CZ05009	07/12/16	07/13/16	SM9223	
Fecal Coliforms	17	1.8	mL "		CZ05013	07/12/16	07/15/16	SM 9221	

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	r Sciences	Project:	SMUD In situ and Bac-T M	9
2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		Project Number: Project Manager:	500.20 / Task 0120.00 Maia Singer	CLS Work Order #: CZG0467 COC #:
,	,	Notes and Defini	5	
3T-4a	<1.8			
T-4	<1			
T	Analyte DETECTED			
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit w	when specified)	
R	Not Reported			
У	Sample results reported on a dry weight bas	s		
PD	Relative Percent Difference			

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 25, 2016

CLS Work Order #: CZG0763 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/18/1616:10. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director



${f C}$ alifornia ${f L}$ aboratory ${f S}$ ervices

ater Sciences Felegraph Ave., Suite 400 Iey, CA 94705					Project SMUD In situ and Bac Project Number: 500.20 / Task 0120.00 Project Manager: Maia Singer					CLS Work Order #: CZ C0763 COC #:										
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1	Report To:						Client Job Number 500.20 Task 0120.00				ANALYSIS REQUESTED						GEOTRACKER			
	Stillwater Sciences 2855 Telegraph Ave. Suite 400 Berkeley, CA 94705 Project Manager Maia Singer maia@stillwatersci.com					Destination Laboratory Rancho Cordova				Fee	Fee				EDF REPORT YES X NO					
								638-7301	1	alco	6	2		GLO	BAI	NLID.				
M						- 3249 Fitzgerald Road Rancho Cordova, CA 95742			PRESERVATIVES	oliforn	liform	coll Quand-tray								
SM	Project Name SMUD In situ and Bac-T Monitoring Sampled By				www.ealifornialab.com				Fecal coliform-15 Tube	Fecal coliform-20 Tube	Y		FIELD		ELD CONDITIONS:					
Job Mor	Jeb Description Monitor seasonal bact		i levels in UARP reaches					be .)C											
Sile	Sile Location UARP													TURNAROUND TIME IN DAYS			SPECIAL INSTRUCTIONS			
DA	те	TIME	SAMPLE		FIELD		CONTAINER							1	2	3	5			
			IDENTIFICAT	COLUMN TO THE OWNER	D,	MATRIX	NO.	TYPE		-					-	100	122			
		14:15	BAC-12 -			Surface water		-	6	X	_	X				1 8	X			
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			BAC -14 -			Surface water			6	X	0	X	10-15-2		5.13	-	X			
7/18	116	30'11	BAC -15-	SCR		Surface water		-	6	X		X	<u></u>	-	-	-	X	k		
	~ 1			1		Surface water		1	6	-	_		<u></u>		3-3	- 3	X	1-100000-0005C		
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	_					Surface water			6	_	_		26.3			-	X			
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				_		Surface water			6		_						x	Project No. 500.20 Tas 0120.00		
			2000-000			Surface water		_	6						1117		X	QUOTEA		
								SAMPLE RETENTION TIME P					nd	PRESERVATIVES (1) HCL (3) = COLD (2) HNO ₁ (4)= H2SO4						
REL					PRINT NAM	IE/COMPANY	- 1	DATE/TIME			RECEI	VED BY	(Signature)				PRE	IT NAME/COMPANY		
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Page 2 of 3								07/25/1	614:04
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5	Project: Number: Manager:	500.20 / T	In situ and B ask 0120.00 er		ring CLS Work Orde COC #:	r #: CZG076 3	
	Microbiologic	al Parame	eters by	APHA	Standard	Method	s		
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-12-IHR (CZG0763-01) Water	Sampled: 07/18/16 14:15	Received: 07	7/18/16 16:	10					
E. Coli	<1	1.0	MPN/100 mL	1	CZ05154	07/18/16	07/19/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ05156	"	07/21/16	SM 9221	
BAC-13-IHR (CZG0763-02) Water	Sampled: 07/18/16 14:00	Received: 07	7/18/16 16:	10					
E. Coli	2.0	1.0	MPN/100	1	CZ05154	07/18/16	07/19/16	SM9223	

E. Con	2.0	1.0	mL		0203134	0//18/16	0//1//10	51417225	
Fecal Coliforms	<1.8	1.8			CZ05156	н.	07/21/16	SM 9221	
BAC-14-BCR (CZG0763-03) Water	Sampled: 07/18/16 12:25	Received: 0'	7/18/16 16:10						
E. Coli	1.0	1.0	MPN/100	1	CZ05154	07/18/16	07/19/16	SM9223	
Fecal Coliforms	4.0	1.8	mL "	11	CZ05156		07/21/16	SM 9221	
BAC-15-SCR (CZG0763-04) Water	Sampled: 07/18/16 11:05	Received: 07	//18/16 16:10						
E. Coli	2.0	1.0	MPN/100 mL	1	CZ05154	07/18/16	07/19/16	SM9223	
Fecal Coliforms	4.5	1.8	"	n	CZ05156	<u>11</u>	07/21/16	SM 9221	

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age 3 o	f 3 rr Sciences	Project:	SMUD In situ and Bac-T l	07/25/16 14:04 Monitoring			
1855 Telegraph Ave., Suite 400 Serkeley, CA 94705			500.20 / Task 0120.00	CLS Work Order #: CZG0763 COC #:			
		Notes and Defin	nitions				
T-4a	<1.8						
T-4	4						
ET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit	when specified)				
R	Not Reported						
У	Sample results reported on a dry weight basis						
PD	Relative Percent Difference						

CA DOHS ELAP Accreditation/Registration Number 1233

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3249 Fitzgerald Road Rancho Cordova, CA 95742

July 26, 2016

CLS Work Order #: CZG0800 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 07/19/16 13:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233



$\mathbf{C}_{\text{ALIFORNIA}} \mathbf{L}_{\text{ABORATORY}} \mathbf{S}_{\text{ERVICES}}$

Report To: Sill values Sill values Sill values Destination Laboratory Report To: Sill values Destination Laboratory Report To: Sill values Destination Laboratory Report To: Sill values Destination Laboratory Marken Condona Sill values Marken Condona Marken Condona Sill values Marken Condona Sill values Marken Condona Sill values Marken Condona Sill values	eregraph Ave., ey, CA 94705	Suite 40(0		Project Nu Project Ma)120	00.		CLS COC		c k	Ord	er #:	CZ G0800
Number Sciences South Tuber South Table (Listed on the second base of the second bas	CALI	FORNI/	LABORATORY S	ERVIC	CES CHAIN	OF CU	STODY	1	cr	S ID. N	٩0	CZG	08	a)	N.	(ol'
Stillwater Sciences Desination Laboratory Rancho Conlors T H EDF REPORT YIS I 2855 Telegraph Ave, Suite 400 Rancho Conlors X CLS (916) 638-7301 Rancho Conlors G.GBAL ID. Project Namer Maia Singer maia@stillwatersci.com Project Namer Rancho Conlors, CA 95742 Project Namer G.GBAL ID. Smipded By OTHER OTHER Project Namer FIELD CONDITIONS: FIELD CONDITIONS: Smipded By OTHER OTHER Stringer water G X I Not location UARP Sampled By Surface water G X I X 7/19/10 Stringer water G X I X I 7/19/10 Stringer water G X I X 7/19/10 Stringer water G X I X 7/19/10 Stringer water G X I X 7/19/11 Stringer water G X I X 7/19/12 Stringer water G X I X 7/19/14 Stringer water G X I X 7/19/16 Stringer water G X I X					Client	Job Numl	ier		AN	ALYSE	s re	QUESTED	GEO	лк	ACKE	R	
Ab Description Monitor reasonal bacteria levels in UARP reaches. TURNAROUND SPECIAL TIME INDAYS DATE TIME SAMPLE FIELD CONTAINER DATE TIME IDENTIFICATION ID. MATRIX No. TYPE 7/19/LQ SSTRUCTIONS Sufface water G X X X 7/19/LQ SSTRUCT CATION ID. MATRIX No. TYPE I Z 3 S 7/19/LQ SSTRUCT CATION ID. MATRIX No. TYPE I Z 3 S 7/19/LQ SSTRUCT CATION ID. MATRIX No. TYPE I Z X 7/19/LQ SSTRUCT Bec water G X I X ID. 7/19/LQ SSTRUE BAC - Do - GC/R Surface water G X ID. X 7/19/LQ SSTRUE BAC - DO - GC/R Surface water G X ID. X 7/19/LQ SSTRUE BAC - DO - LO/R Surface water G X ID. X 7/19/LL IL SSAN BAC - DO -LO/R Surface water G X ID. X 7/19/LL IL SSAN BAC - ID - O/R Surface water G X					Destinat	ion Labora	Mory		E. col Feca				EDI	RE	PORT		YES X NO
Deb Description Monitor second function levels in UARP reaches. TURNAROUND SPECIAL TIME INDAYS Note Location UARP Interview of the second function levels in UARP reaches. Interview of the second function levels in UARP reaches. DATE TIME SAMPLE FELD CONTAINER DATE TIME DENTIFICATION D.2. MATRIX No. TYPE 7/19/LL 9:53ch LBRC - 5 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 10 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 0.02L Surface water 6 X X X 7/19/LL 0:53ch LBRC - 9 - 0.02L Surface water 6 X X X 7/19/LL 0:53ch LBRC - 10 - 0.01L Surface water 6 X X X 7/19/LL 0:40ch BRC - 10 - 0.01L Surface water 6 X X X 7/19/LL 0:40ch BRC - 10 - 0.01L Surface water 6 X X X <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">al co</td><td colspan="2">Qu</td><td>GLO</td><td>)BA</td><td>L ID.</td><td></td><td></td></t<>									al co		Qu		GLO)BA	L ID.		
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Deb Description Monitor second function levels in UARP reaches. TURNAROUND SPECIAL TIME INDAYS Note Location UARP Interview of the second function levels in UARP reaches. Interview of the second function levels in UARP reaches. DATE TIME SAMPLE FELD CONTAINER DATE TIME DENTIFICATION D.2. MATRIX No. TYPE 7/19/LL 9:53ch LBRC - 5 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 10 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 6CCL Surface water 6 X X X 7/19/LL 0:53ch LBRC - 20 - 0.02L Surface water 6 X X X 7/19/LL 0:53ch LBRC - 9 - 0.02L Surface water 6 X X X 7/19/LL 0:53ch LBRC - 10 - 0.01L Surface water 6 X X X 7/19/LL 0:40ch BRC - 10 - 0.01L Surface water 6 X X X 7/19/LL 0:40ch BRC - 10 - 0.01L Surface water 6 X X X <t< td=""><td>SMUE</td><td>In situ a</td><td>nd Bac-T Monitoring</td><td></td><td>www.eat</td><td>iforniala</td><td>b.com</td><td colspan="5">ESERV</td><td></td></t<>	SMUE	In situ a	nd Bac-T Monitoring		www.eat	iforniala	b.com	ESERV									
Definite vectors in CAAP relation. THURNAROUND SPECIAL Site Location UARP DATE TIME IDENTIFICATION D. MATRIX No. TVPE 1 2 3 5 7/19/L4 2:55th BBC - 5 - GCR Surface water 6 X X 1 X 1 X 7/19/L4 2:55th BBC - 5 - GCR Surface water 6 X X 1 X 7/19/L4 2:55th BBC - 10 - GCR Surface water 6 X X 1 X 7/19/L4 2:55th BBC - 9 - CCR Surface water 6 X X 1 X 7/19/L4 2:55th BBC - 9 - COR Surface water 6 X X 1 X 7/19/L4 1:10:5th BBC - 9 - COR Surface water 6 X X 1 X 7/19/L4 1:10:5th BBC - 10 - COUR Surface water 6 X X 1 X 7/19/L4 1:10:5th BBC - 10 - COUR Surface water 6 X X 1 X 7/19/L4 1:10:5th BBC - 10 - COUR Surface water 6 X X 1 <t< td=""><td>Job Descri</td><td>tion</td><td></td><td></td><td colspan="4">OTHER 2</td><td>ube</td><td>uhe</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Job Descri	tion			OTHER 2				ube	uhe	2						
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Muy Cap KELLEIGH CROWE 7/19/16	RELING	ISUED BY (S	ionanine)	PRINT NAM	IE/COMPANY		DATE/TIME			RECEP	VEDE	BY (Signature)	-	_			And the second se
		6		C. 200 3. C. 3.	1-20			1	-	S. Colder				_		1.226	
		NE					:30 PM				-						
RECEIVED AT LAR BY: MULLI ML DATE TIME: 7 / 9/6 1330 CONDITIONS/COMMENTS: 2.1.	10an		/ >1/1						where	ioserre	MM	INTS: 7	1	-			

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Page 2 of 3								07/26/16	512:38
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705					ask 0120.00		ng L S Work Orde OC #:	r #: CZG0800	
	Microbiologic	al Parame	ters by	APHA	Standard	Methods			
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-5-GCR (CZG0800-01) Water	Sampled: 07/19/16 09:50	Received: 07	//19/16 13:	30					
E. Coli	6.3	1.0	MPN/100) 1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	6.8	1.8	mL "	"	CZ05196	п	07/22/16	SM 9221	
BAC-6-GCR (CZG0800-02) Water	Sampled: 07/19/16 10:15	Received: 07	/19/16 13:	30					
E. Coli	<1	1.0	MPN/100	1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ05196	н	07/22/16	SM 9221	
BAC-7-UVR (CZG0800-03) Water	Sampled: 07/19/16 08:50	Received: 07	/19/16 13:	30					
E. Coli	<1	1.0	MPN/100	1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	2.0	1.8	mL "	"	CZ05195		07/22/16	SM 9221	
BAC-8-UVR (CZG0800-04) Water	Sampled: 07/19/16 09:15	Received: 07	/19/16 13:	30					
E. Coli	<1	1.0	MPN/100	1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	<i>n</i>	CZ05195	"	07/22/16	SM 9221	
BAC-9-UVR (CZG0800-05) Water	Sampled: 07/19/16 11:05	Received: 07	/19/16 13:	30					
E. Coli	<1	1.0	MPN/100	1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	2.0	1.8	mL "	п	CZ05195	"	07/22/16	SM 9221	
BAC-10-UVR (CZG0800-06) Water	Sampled: 07/19/16 10:40	Received: 0	7/19/16 13	8:30					
E. Coli	<1	1.0	MPN/100	1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	11	1.8	mL "		CZ05195		07/22/16	SM 9221	
BAC-11-JR (CZG0800-07) Water	Sampled: 07/19/16 11:40	Received: 07/	19/16 13:3	0					
E. Coli	8.6	1.0	MPN/100) 1	CZ05194	07/19/16	07/20/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	.,	CZ05195		07/22/16	SM 9221	

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California Laboratory Services

Stillwate	er Sciences	Project:	SMUD In situ and Bac-T I	Monitoring			
	legraph Ave., Suite 400 y, CA 94705	Project Number: Project Manager:	500.20 / Task 0120.00 Maia Singer	CLS Work Order #: CZG0800 COC #:			
		Notes and Defin	litions				
8T-4a	<1.8						
T-4	4						
ET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit	when specified)				
R	Not Reported						
ry	Sample results reported on a dry weight basis						
PD	Relative Percent Difference						

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3249 Fitzgerald Road Rancho Cordova, CA 95742

August 30, 2016

CLS Work Order #: CZH1100 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 08/23/16 16:00. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAPAccreditation/Registration number 1233



$\mathbf{C}_{\text{ALIFORNIA}} \mathbf{L}_{\text{ABORATORY}} \mathbf{S}_{\text{ERVICES}}$

ter Sciences elegraph Ave. eg. CA 94705		00					500.20/	Tasl			ic-T	0533	- C		Ог	der#	: CZH1100
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		Repor	t To:			Job Numb Task 0120.			AN/	ALYSI	S RE	QUESTED	GID	OTR/	CKE	R	
	er Sciene elegraph	es Ave. Suite	400			Destination Laboratory Rancho Cordova			Fee	E.co		ED	FRIJ	ORT		YES X D NO	
	y, CA 94				X CLS (916) 638-730) 3249 Fitzgerald Road				al coli	il coli	li Qua		GL	DBAI	. ID,		
	inger ma	ia@stillwa	tersci.com			ho Cordo		Fecal coliform-15 Tube PRESERVATIVES	iforn	form	coli Quanti-traș		L				
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Joh Descri Monitor se		a levels in UAB	P reaches					IVES	×	¢							
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DATE	TIME		AMPLE FIFICATION	FIELD ID.	MATRIX	CON NO.	TYPE	v					1	2	3	5	
8/23/16	11:00AH	BAC-	1-BI		Surface water		1	6	X		×					X	
8/23/16	12:05 91		Z-BI		Surface water			6	X		×					X	
8/23/16	2:20pt		3-4		Surface water		-	6	×		X					Х	
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-1-7					Surface water			6								X	
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					Surface water			6								X	INVORTE TO: .
					Surface water			6								X	Stillwater Sciences
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SUSPECT	ED CONSTI	TUENTS			· · · · · · · · · · · · · · · · · · ·				SAM	PLERET	ENT	ON TIME	PRI	SER	VATI	VES (1	HCL (3) = COLD (1) HNO ₅ (4)= H2SO4
RELINON	SHEDARY (S	sfemature)	A2	PRINTNAM	IE/COMPANY	1	ATE/TIME	1	_	RECEI	VED	Y (Signature)	-				IT NAME/COMPANY
Acres	1/	ul		EIGH	ROWE R SCIEN		123/16										
AFC VIV	ED AT LAI	B BY:	05	LLUMATE	DATE/TIME: 8	123/1	1400	CONDITIONSCOMMENTS: (2,00)									

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Stillwater Sciences	Project:	SMUD In situ and Bac-T M	Monitoring
2855 Telegraph Ave., Suite 400	Project Number:	500.20 / Task 0120.00	CLS Work Order #: CZH1100
Berkeley, CA 94705	Project Manager:	Maia Singer	COC #:

Analyte	Resul	Reporting t Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-1-BI (CZH1100-01) Water	Sampled: 08/23/16 11:00	Received: 08/23	/16 16:00						
E. Coli	<1	1.0	MPN/100	1	CZ06144	08/23/16	08/24/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ06145	п	08/26/16	SM 9221	
BAC-2-BI (CZH1100-02) Water	Sampled: 08/23/16 12:05	Received: 08/23	/16 16:00						
E. Coli	<1	1.0	MPN/100	1	CZ06144	08/23/16	08/24/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	п	CZ06145		08/26/16	SM 9221	
BAC-3-LL (CZH1100-03) Water	Sampled: 08/23/16 14:20	Received: 08/2.	8/16 16:00						
E. Coli	<1	1.0	MPN/100	1	CZ06144	08/23/16	08/24/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ06145		08/26/16	SM 9221	
BAC-4-LL (CZH1100-04) Water	Sampled: 08/23/16 13:55	Received: 08/2.	3/16 16:00						
E. Coli	<1	1.0	MPN/100	1	CZ06144	08/23/16	08/24/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ06145		08/26/16	SM 9221	

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age 3 o Stillwate	r Sciences	Project:	SMUD In situ and Bac-T I	08/30/16 12:40 Monitoring			
	egraph Ave., Suite 400 7, CA 94705	Project Number: Project Manager:	500.20 / Task 0120.00 Maia Singer	CLS Work Order #: CZH1100 COC #:			
		Notes and Defin	iitions				
8T-4a	<1.8						
T-4	4						
ET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the re	porting limit (or method detection limit v	when specified)				
R	Not Reported						
гy	Sample results reported on a dry weight basis						
PD	Relative Percent Difference						

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3249 Fitzgerald Road Rancho Cordova, CA95742

September 07, 2016

CLS Work Order #: CZH1347 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 08/30/1616:19. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233



Page 1 of 3 09/07/16 13:42 Stillwater Sciences Project: SMUD In situ and Bac-T Monitoring CLS Work Order #: CZH1347 2855 Telegraph Ave., Suite 400 Project Number: 500.20 / Task 0120.00 Berkeley, CA94705 Project Manager: Maia Singer COC #: CLS ID. NO. C2H13H7 CALIFORNIA ABORATORY SERVICES CHAIN OF CUSTODY (of) Client Job Number 500.20 Task 0120.00 Report To: ANALYSIS REQUESTED GEOTRACKER Destination Laboratory Rancho Cordova Stillwater Sciences YES X NO Fecal coliform-15 Tube PRESERVATIVES Fecal coliform-20 Tube EDF REPORT . coli Quanti-tray 2855 Telegraph Ave. Suite 400 × CLS (916) 638-7301 Berkeley, CA 94705 GLOBAL ID. 3249 Fitzgerald Road Rancho Cordova, CA 95742 Maia Singer maia@stillwatersci.com FIELD CONDITIONS www.californialab.com SMUD In situ and Bac-T Monitoring O OTHER Job Description Monitor seasonal bacteria levels in UARP reaches. TURNAROUND TIME IN DAYS SPECIAL INSTRUCTIONS Site Location UARP CONTAINER SAMPLE IDENTIFICATION FIELD ID. 2 3 1 5 DATE TIME V MATRIX TYPE NO. 6/10/16 10:00 3AC-1- BI 6 7 Surface water 2 x 8/30/16 10:30 BAC- 2- 5I 8/20/16 14:00 BAC- 2- 5I 8/20/16 14:00 BAC- 3- 66 8/30/16 13:45 BAC- 4-66 Surface water 6 > × х 6 × Surface water х × Surface water 6 * 4 x Surface water 6 X Surface water 6 х INVOICE TO Surface water x 6 X Stillwater Sciences Surface water 6 Same as abov Surface water 6 x Surface water 6 х X Project No. 500.20 Task 0120.00 Surface water 6 Surface water X QUOTE# 6 SUSPECTED CONSTITUENTS SAMPLE RETENTION T VES (1) HCL (3) ~ COLD (2) HNO₅ (4)= H2SO4 PRINT NAME/COMPANY RELINQUISHED BY (Signature) RECEIVED BY (Signature) DATE/TIME PRINT NAME/COMPANY 9/11/16 AnnAS BRUCE HITE H Multi yula ATEN SCIENCES 16:30 Multi yula DATETINE: 3:3016 1619. CONDITIONSCOMMENTS:

\mathbf{C} ALIFORNIA \mathbf{L} ABORATORY \mathbf{S} ERVICES

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AIR BILL#



Page 2 of 3								09/07/1	613:42
Stillwater Sciences			Project:	SMUD	In situ and B	ac-T Monitori	ng		
2855 Telegraph Ave., Suite 400		Project	Number:	500.20 / T	ask 0120.00	С	LS Work Orde	r #: CZH1 34 7	
Berkeley, CA 94705		Project	Manager:	Maia Sing	er	C	COC #:		
	Microbiolog	gical Parame	ters by	APHA	Standard	Methods			
Analyte	Resul	Reporting t Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-1-BI (CZH1347-01) Water	Sampled: 08/30/16 10:00	Received: 08/30	/16 16:19						
E. Coli	<1	1.0	MPN/100 mL	1	CZ06341	08/30/16	08/31/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ06337	n	09/02/16	SM 9221	
BAC-2-BI (CZH1347-02) Water	Sampled: 08/30/16 10:30	Received: 08/30	/16 16:19						
E. Coli	<1	1.0	MPN/100	1	CZ06341	08/30/16	08/31/16	SM9223	
Fecal Coliforms	4.5	1.8	mL "	"	CZ06337	н	09/02/16	SM 9221	
BAC-3-LL (CZH1347-03) Water	Sampled: 08/30/16 14:00	Received: 08/3	0/16 16:19						
E. Coli	<1	1.0	MPN/100 mL	1	CZ06341	08/30/16	08/31/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	ан. С	CZ06337	"	09/02/16	SM 9221	
BAC-4-LL (CZH1347-04) Water	Sampled: 08/30/16 13:45	Received: 08/3	0/16 16:19						
E. Coli	<1	1.0	MPN/100 mL	1	CZ06341	08/30/16	08/31/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	19.	CZ06337	"	09/02/16	SM 9221	

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^o age 3 o	of 3			09/07/16 13:42				
2855 Tel	er Sciences legraph Ave., Suite 400 y, CA 94705	Project: Project Number: Project Manager:	500.20 / Task 0120.00	Monitoring CLS Work Order #: CZH1347 COC #:				
		Notes and Defin	litions					
BT-4a	<1.8							
3T-4	<1							
ЭЕТ	Analyte DETECTED							
1D	Analyte NOT DETECTED at or above the reporting	; limit (or method detection limit	when specified)					
JR.	Not Reported							
lry	Sample results reported on a dry weight basis							
PD	Relative Percent Difference							

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3249 Fitzgerald Road Rancho Cordova, CA95742

September 13, 2016

CLS Work Order #: CZI0188 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/06/1616:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAPAccreditation/Registration number 1233



$\mathbf{C}_{\text{ALIFORNIA}} \mathbf{L}_{\text{ABORATORY}} \mathbf{S}_{\text{ERVICES}}$

ater Science Telegraph As ley, CA947(re., Suite	400			Project N Project M	umber:	500.20/	Tas	k 01		c-1 1		Same		τ O1	der ≉	#: CZI0188
CAI	IFORN	IA LABORAT	ORY S	ERVIC	ES CHAIN	OF CU	STODY		CI	.S ID. N	XO	CZIC	2/8	36	3		(of
	~~~	Report To:	W			Job Numb Task 0120,			A	ALYSIS	REG	QUESTED	GEC	TR/	CKE	R	
	ater Scier	nces n Ave. Suite 400			Destinat	ion Labora ho Cordov	lory .		Fee	Fecz	E. co		EDF	REF	ORT		YES X D NO
Berk	eley, CA 9	4705				(916) 63			alco	deco	i Qi		GLO	BAL	. ID,		
Maia		aia@stillwatersei.e	com		3249	Fitzgerald ho Cordov 2		PRESERVATIVES	oliform	Fecal coliform-20 Tube	coli Quanti-tray						
Project SMU Sample	D In situ	and Bac-T Monito	ring			ifornialal	o.com	SERV	-15 T	-20 Th			PUL	.00	UND	TIONS	2
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-	Contra la				Surface water		1	6								x	Stillwater Sciences
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Fecal Coliforms

Fecal Coliforms

Fecal Coliforms

E. Coli

E. Coli



# CALIFORNIA LABORATORY SERVICES

<1.8

<1

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2.0

VARP-BAC-3-LL (CZI0188-03) Water Sampled: 09/06/16 14:08 Received: 09/06/16 16:30

VARP-BAC-4-LL (CZI0188-04) Water Sampled: 09/06/16 13:52 Received: 09/06/16 16:30

Page 2 of 3								09/13/1	6 13:30
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		5			In situ and Ba ask 0120.00 er	ac-T Monito	ring CLS Work Orde COC #:	r #: CZI0188	
	Microbiological	Parame	ters by	APHA	Standard	Method	s		
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VARP-BAC-1-B1 (CZI0188-01) Water	Sampled: 09/06/16 10:00	Received	: 09/06/16	16:30					
E. Coli	1.0	1.0	MPN/100 mL	) 1	CZ06505	09/06/16	09/07/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	"	CZ06507	91	09/09/16	SM 9221	A-CO
/ARP-BAC-2-B1 (CZI0188-02) Water	Sampled: 09/06/16 10:20	Received	: 09/06/16	16:30					
E. Coli	<1	1.0	MPN/100	1	CZ06505	09/06/16	09/07/16	SM9223	

mL

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Stillwate	r Sciences	Project: SMUD In situ and	Bac-T Monitoring
2855 Tel	egraph Ave., Suite 400	Project Number: 500.20 / Task 0120.0	00 CLS Work Order #: CZI0188
Berkeley	, CA 94705	Project Manager: Maia Singer	COC #:
		Notes and Definitions	
T-4a	<1.8		
T-4	<1		
-COM	Setup one-minute outside of recommer	ded holding time.	
T	Analyte DETECTED		
D	Analyte NOT DETECTED at or above the r	eporting limit (or method detection limit when specified)	
R	Not Reported		
у	Sample results reported on a dry weight bas	is	
PD	Relative Percent Difference		

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3249 Fitzgerald Road Rancho Cordova, CA 95742

September 21, 2016

CLS Work Order #: CZ10576 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/14/1615:30. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

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ter Sciences elegraph Av	e., Suite 4	400		r Project N	Second Contract					iC-1	Monitoriną CL	Same	orh	Or	der #	≠: CZI0576
y, CA 9470.	5			Project M	anager:	MaiaSir	ıger	8			CO	C #:				
CAL	IFORNI	ia Laborat	ORY SERVIC	CES CHAIN	OF CUS	STODY	2	CL	S ID.	NO.	ĊZĮ	05	7	0		(of
		Report To:			Job Numbe Task 0120.0		1	AN	ALYS	S RE	QUESTED	GEO	OTR/	CKE	ĸ	
	ater Seier Felegraph	ices Ave. Suite 400			ion Laborat ho Cordova			Fee	Fect	E. co		EDI	FREE	ORT		YES X IN NO
Berkel	ey, CA 9	4705		x CLS	(916) 63	8-7301		al co	al coli			GLO	DBAI	. ID.		
Project M Maia		aia@stillwatersei.	com		Fitzgerald ho Cordov		-22	lifori	iforn	E. coli Quanti-tray						
Project N SMUI Sampled	D In situ	and Bac-T Monito	oring		ifornialab	.com	PRESERVATIVES	n-15 Tu	Fecal coliform-20 Tube	W		FIE	LDC	OND	TIONS	1
Job Descr Monitor s	ription casonal bacte	ria levels in UARP reaches		]			TIVES	be	ĕ							
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7/14	13:25	134C-3-44		Surface water	;		6	X	2 2	×			-	_	x	
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		(		Surface water			6	-	Sterio e				-	-	x	INVOICE TO:
11	-			Surface water			6		0						x	Stillwater Sciences
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2855 Telegraph Ave., Suite 400	Project Number:	500.20 / Task 0120.00	CLS Work Order #: CZI0576
Berkeley, CA 94705	Project Manager:	Maia Singer	COC #:
М	licrobiological Parameters by	APHA Standard Me	thods

Analyte	Resu	Reporting lt Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-1-BI (CZI0576-01) Water	Sampled: 09/14/16 09:05	Received: 09/14	/16 15:30						
E. Coli	<1	1.0	MPN/100	1	CZ06744	09/14/16	09/16/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ06748	09/14/16	09/17/16	SM 9221	A-COM
BAC-2-BI (CZI0576-02) Water	Sampled: 09/14/16 09:30	Received: 09/14	/16 15:30						
E. Coli	<1	1.0	MPN/100	1	CZ06744	09/14/16	09/16/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ06748	09/14/16	09/17/16	SM 9221	A-COMa
BAC-3-LL (CZI0576-03) Water	Sampled: 09/14/16 13:25	Received: 09/14	4/16 15:30						
E. Coli	<1	1.0	MPN/100 mL	1	CZ06744	09/14/16	09/16/16	SM9223	
Fecal Coliforms	<1.8	1.8	"	11	CZ06748	09/14/16	09/17/16	SM 9221	
BAC-4-LL (CZI0576-04) Water	Sampled: 09/14/16 13:10	Received: 09/14	4/16 15:30						
E. Coli	<1	1.0	MPN/100 mL	1	CZ06744	09/14/16	09/16/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	п	CZ06748	09/14/16	09/17/16	SM 9221	

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# California Laboratory Services

Stillwater Sciences	Project: SMUD In situ and	3ac-T Monitoring
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0120.0	) CLS Work Order #: CZI0576
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

6 m		Reporting		Spike	Source		%REC		RPD		
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes	
Batch CZ06744 - General											
	Prepared: 09/15/16 Analyzed: 09/16/16										
Blank (CZ06744-BLK1)				Prepared: (	09/15/16 A	nalyzed: 09	/16/16				
Blank (CZ06744-BLK1) Total Coliforms	ND	1.0 N	IPN/100 mL		09/15/16 A	nalyzed: 09	/16/16				

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	Sciences	Project:		<u> </u>
	egraph Ave., Suite 400		500.20 / Task 0120.00	CLS Work Order #: CZI0576 COC #:
serkeley,	CA 94705	Project Manager:	9	
		Notes and Defin	itions	
Г-4а	<1.8			
Г-4	<1			
COMa	Prepared one-minute outside of hold time.			
COM	Prepared 26-minutes outside of hold time.			
T	Analyte DETECTED			
þ	Analyte NOT DETECTED at or above the reporting lim	it (or method detection limit	when specified)	
ι	Not Reported			
r	Sample results reported on a dry weight basis			
D	Relative Percent Difference			

CA DOHS ELAP Accreditation/Registration Number 1233

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3249 Fitzgerald Road Rancho Cordova, CA 95742

September 27, 2016

CLS Work Order #: CZI0814 COC #:

Maia Singer Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705

Project Name: SMUD In situ and Bac-T Monitoring

Enclosed are the results of analyses for samples received by the laboratory on 09/20/16 16:07. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D. Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233



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eley, C	raph Aw A 9470:	e., Suite 4 5	40.0				Jumber:	500.20/	Tasl	k01			2.753	56	<u> 1</u> 000	h Order #: CZI0814		
	CAL	IFORNI	A LABORAT	ORY S	ERVIC	ES CHAIN	OF CU	STODY		CL	S ID. M	ю	(2108	14			_	( of
			Report To:				Job Numb Task 0120.		T	AN	ALYSE	S RE	QUESTED	GEO	TRA	CKE	R	
		ter Scien elegraph	ees Ave. Suite 400			Destinat	ion Labora ho Cordov	tory		Fee	Feca	E. co		EDF	REP	ORT		YES X IN NO
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1	Mata 2 Project Na		aia@stillwatersci.	com		9574	2		RES	- EB-	Im-2	tray		FIEL	DC	OND	TIONS	
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3	7/20	13:40	BAC - 3 - 6	4		Surface water			6	×		×				_	х	
	9/20	13: z+	13 AC 4- 6	4		Surface water			6	×		X			_	-	X	
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1						Surface water			6								X	Stillwater Sciences
						Surface water			6								X	Same as above
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						Surface water	_		6								x	Project No. 500.20 Tas 0120.00
						Surface water			6								х	QUOTEA
	SUSPECT	ED CONST	ITUENTS		Ø.				1	SAM	IPLE RET	ENTI	IN TIME	PRE	SERT	VATI		1) HCl. (3) = COLD 2) HNO ₁ (4)= H2SO4
	RELINQU	ISHED BY (	Signature)		PRINT NAM	ECOMPANY	1	ATE/TIME			RECEP	/ED B	Y (Signature)	_			PRE	NT NAME/COMPANY
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	0		A. A	STILL	MATER	SCIENCES		1:07			_						_	
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Stillwater Sciences	Project: SMUD In situ and Bac-	' Monitoring
2855 Telegraph Ave., Suite 400	Project Number: 500.20 / Task 0120.00	CLS Work Order #: CZI0814
Berkeley, CA 94705	Project Manager: Maia Singer	COC #:

Analyte	Resu	Reporting It Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
BAC-1-B1 (CZI0814-01) Water	Sampled: 09/20/16 09:45	Received: 09/20	/16 16:07						
E. Coli	<1.0	1.0	MPN/100	1	CZ06906	09/20/16	09/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	"	CZ06912		09/23/16	SM 9221	
BAC-2-B1 (CZI0814-02) Water	Sampled: 09/20/16 09:20	Received: 09/20	/16 16:07						
E. Coli	<1.0	1.0	MPN/100	1	CZ06906	09/20/16	09/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ06912	11	09/23/16	SM 9221	
BAC-3-LL (CZI0814-03) Water	Sampled: 09/20/16 13:40	Received: 09/20	/16 16:07	0					
E. Coli	<1.0	1.0	MPN/100 mL	) 1	CZ06906	09/20/16	09/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "		CZ06912	"	09/23/16	SM 9221	
BAC-4-LL (CZI0814-04) Water	Sampled: 09/20/16 13:20	Received: 09/20	/16 16:07						
E. Coli	<1.0	1.0	MPN/100	) 1	CZ06906	09/20/16	09/21/16	SM9223	
Fecal Coliforms	<1.8	1.8	mL "	л	CZ06912	"	09/23/16	SM 9221	

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Page 3 o	f 3		09/27/16 11:57				
Stillwater Sciences 2855 Telegraph Ave., Suite 400 Berkeley, CA 94705		Project: SMUD In situ and Bac-T M Project Number: 500.20 / Task 0120.00 Project Manager: Maia Singer	Monitoring CLS Work Order #: CZI0814 COC #:				
		Notes and Definitions					
BT-4a	<1.8						
3T-4	<1.0						
DET	Analyte DETECTED						
D	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)						
IR	Not Reported						
ry	Sample results reported on a dry weight bas	is					
<b>PD</b>	Relative Percent Difference						

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Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

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### APPENDIX G Field Collection Methods for Metals Bioaccumulation Sampling



Sacramento Municipal Utility District Upper American River Project FERC Project No. 2101

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### Cruise Report for the Water Quality Monitoring Plan for the Upper American River Project (UARP)/FERC Project No. 2101 Sacramento Municipal Utility District (SMUD) Sampling Dates: August 29 – September 1, 2016

#### Written by: April Sjoboen Guimaraes California Department of Fish and Wildlife (CDFW)/Marine Pollution Studies Laboratories (MPSL) at Moss Landing Marine Laboratories

### 1.0 Introduction

This work was performed for the Sacramento Municipal Utility District (SMUD) as part of their relicensing requirements through the Water Quality Monitoring Plan for the Upper American River Project (UARP)/FERC Project No. 2101.

The UARP is situated within El Dorado and Sacramento counties in the basin of the American River and consists of eleven reservoirs and eight powerhouses. Operated by SMUD, it is a 688-megawatt hydroelectric system capable of generating enough electricity to meet about 20 percent of customer demand. It covers over 6400 acres in the El Dorado National Forest and land administered by the Bureau of Land Management, and receives runoff from approximately 674 square miles. The UARP also has extensive recreational facilities at many of the reservoirs.

The UARP water quality plan includes monitoring of the following: 1) basic *in situ* parameters, 2) general water chemistry, 3) bacteria, and 4) metals bioaccumulation. The portion of this plan detailed below only describes the activities in Part 4: the bioaccumulation of metals in fish.

### 2.0 Cruise Report

### 2.1 Objectives

The objectives were to collect designated sportfish species as identified by the SMUD Water Quality Monitoring Plan (May 2015). We targeted the following primary fish species at all lakes: brown trout (*Salmo trutta*), smallmouth bass (*Micropterus dolomieu*), rainbow trout (*Oncorhynchus mykiss*) and Sacramento pikeminnow (*Ptychocheilus grandis*). In some cases, other fish species were collected. A minimum of three individuals from each species were sampled from each lake, non-size specific. If hardhead were seen, they were returned unharmed to the reservoir.

Sample sites were reached by boating and fish were collected by gill nets and electro-shocking boats.



#### 2.2 MPSL/CDFW Sampling personnel

William Jakl Stephen Martenuk John Negrey April Guimaraes Crew Lead Crew Lead Research Tech Research Tech

#### 2.3 Authorization to collect samples

All sampling personnel are MPSL staff contracted through San Jose State University Research Foundation (SJSURF) and the California Department of Fish and Wildlife (CDFW) to conduct the sample collection activities listed herein.

#### 2.4 Station selection

The study area includes seven project reservoirs and diverted stream reaches. Reservoirs included in the fish monitoring program include Chili Bar, Loon Lake, Gerle Creek, Ice House, Union Valley, Camino, and Slab Creek.

Fish tissues were sampled to assess potential bioaccumulation of metals in resident fish within these reservoirs in accordance with protocols of the State Water Quality Control Board (SWRCB) Surface Water Ambient Monitoring Program (SWAMP). Fish collection was conducted using gill nets and electro-fishing boats; techniques approved by the CDFW.

#### 2.5 Summary of types of samples authorized to be collected

One to five species of sport fish were collected to better determine contamination risks at the chosen lakes. Target species included brown trout (*Salmo trutta*), smallmouth bass (*Micropterus dolomieu*), rainbow trout (*Oncorhynchus mykiss*) and Sacramento pikeminnow (*Ptychocheilus grandis*). An attempt was made to collect a minimum of three fish per species. Physical parameters were collected for each individual fish, which included: weight, total length, fork length and presence of any abnormalities. Each sport fish was individually tagged, wrapped in aluminum foil, placed in a labeled zipper-closure bag and stored on dry ice for the duration of the trip.

At the MPSL/CDFW lab, samples were stored in a freezer until they were processed for authorized analysis, per appropriate SOP's. Analysis authorization dictates tissue analysis (QA/QC requirements-preservatives, dissecting, cooling, etc.).

#### 2.6 Discussion

A total of seven lakes were sampled: Camino Reservoir, Chili Bar Reservoir, Gerle Creek Reservoir, Ice House Reservoir, Loon Lake, Slab Creek Reservoir and Union Valley Reservoir. Due



to the lake size, Union Valley Reservoir was divided into two separate locations and sampled on multiple days. Relative locations of the water bodies are shown in Figure 1. The collections were done over a period of four consecutive days: August 29 through September 1, 2016.

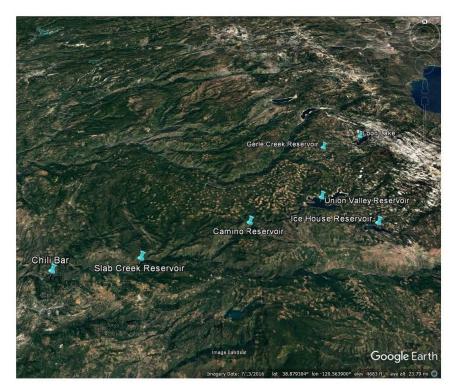


Figure 1. Overview of lakes sampled.

### 2.7 Results

A summary of the number of fish samples collected from the seven water bodies are in Table 1.

Two CDFW/MPSL teams sampled the lakes and reservoirs. More detail regarding maps of the sampling effort for each water body, the sampling crew, station name, date, species collected and total length, are linked to Table 2.7.1 below.



	Rainbow Trout	Brown Trout	Lahontan Cutthroat	Smallmouth Bass	Kokanee	Mackinaw	Sacramento Pike Minnow
Camino Reservoir		10	3				
Chili Bar Reservoir	5	3					5
Gerle Creek Reservoir		14					
Ice House Reservoir	5	3					
Loon Lake	4	3					
Slab Creek Reservoir	4	4					7
Union Valley Reservoir Location 1	10			3	1	5	
Union Valley Reservoir Location 2	8	1		7	3		

### Table 1. Fish Collection Summary

### 2.7.1 Table of Contents for SMUD Fish Study

Lake Name	Page Number
Camino Reservoir	<u>5</u>
Chili Bar Reservoir	<u>7</u>
Gerle Creek Reservoir	2
Ice House Reservoir	<u>11</u>
Loon Lake	15
Slab Creek Reservoir	<u>17</u>
Union Valley Reservoir	<u>20</u>



### **Camino Reservoir**



Figure 2. Camino Reservoir sampling locations.

**Collection Method:** Electro-fisher boat, gill net **Date(s) of Collection:** August 30, 2016 **Sample Effort:** 0900 – 1230 (3.5 hours) **Samplers:** William Jakl and April Guimaraes



			Spc	ortfish Spe	cies TL (m	m)			
Lahontan Cutthroat ( <i>Oncorhynchus clarki henshawi</i> )									
			240	242	246				
			Bro	wn Trout (	Salmo trutt	a)			
255	262	263	265	280	290	293	299	315	320

**Comments:** The sampling vessel was launched from the bank. The whole lake was sampled several times using the electro-fisher boat. All fish sampled are from gill nets.

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# Chili Bar Reservoir

Figure 3. Chili Bar Reservoir sampling locations.

**Collection Method:** Electro-fisher boat, gill net **Date(s) of Collection:** August 29, 2016 **Sample Effort:** 1120 - 1630 (5.2 hours) **Samplers:** William Jakl and April Guimaraes



	Sportfis	h Species	TL (mm)				
	Brown T	rout (Salma	o trutta )				
	425	465	509				
Ra	inbow Trou	t (Oncorhy	nchus myki:	ss)			
215	245	257	272	360			
Sacrame	Sacramento Pikeminnow (Ptychocheilus grandis)						
185	196	197	221	230			

**Comments:** The sampling vessel was launched from the main launch ramp. One brown trout was collected in the gill nets, the other specimens were collected using the electro-fisher boat.





## Gerle Creek Reservoir

Figure 4. Gerle Creek Reservoir sampling locations.

**Collection Method:** Electro-fisher boat, gill net **Date(s) of Collection:** August 31, 2016 **Sample Effort:** 0830 - 1315 (4.75 hours) **Samplers:** William Jakl and April Guimaraes

	Sp	ortfish Spe	ecies TL (m	m)		
Brown Trout (Salmon trutta)						
194	230	239	277	285	293	
294	295	305	315	315	317	



**Comments:** The sampling vessel was launched from the gravel launch ramp. Six of the fourteen specimens collected were done so via gill net. The entire lake was electro-fished.





# **Ice House Reservoir**

Figure 5a. Ice House Reservoir sampling locations.

**Collection Method:** Electro-fisher boat, gill net **Date(s) of Collection:** August 29, 2016 **Sample Effort:** 1300 - 1845 (5.75 hours) **Samplers:** John Negrey and Stephen Martenuk





Figure 5b. Ice House Reservoir sampling locations.





Figure 5c. Ice House Reservoir sampling locations.





Figure 5d. Ice House Reservoir sampling locations.

	Sportfis	h Species	TL (mm)				
Ra	inbow Trou	t (Oncorhy	nchus myki.	s s)			
276	283	286	295	395			
	Brown Trout (Salmo trutta)						
	428	457	602				

**Comments:** The sampling vessel was launched from the main launch ramp. Four rainbow trout were caught via gill net, the remainder via the electro-fisher boat. The electro-fisher boat was only able to output 2 amps throughout the sampling effort.



# Loon Lake



Figure 6a. Loon Lake sampling locations.

Collection Method: Electro-fisher boat, gill net Date(s) of Collection: August 30, 2016 Sample Effort: 0915 – 1730 (8.25 hours) Samplers: John Negrey and Stephen Martenuk



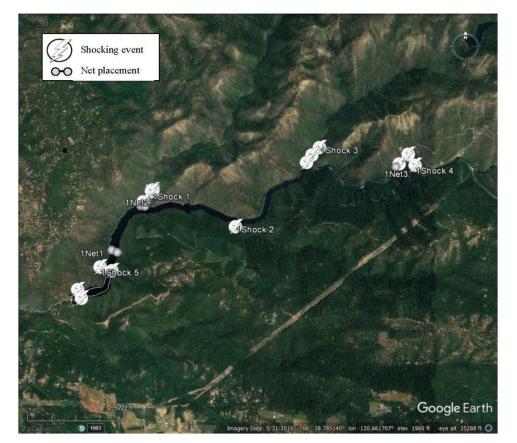


Figure 6b. Loon Lake sampling locations.

	Sportfish S	pecies TL (mi	m)
Rair	bow Trout (C	Oncorhynchus	mykiss)
209	211	374	381
	Brown Trou	t (Salmo trutte	a)
	442	461	504

**Comments:** The sampling vessel was launched from the main launch ramp. Two rainbow trout were collected via electro-fishing, the remainder of the samples by gill nets.





# Slab Creek Reservoir

Figure 7a. Slab Creek Reservoir sampling locations.

**Collection Method:** Electro-fisher boat, gill net **Date(s) of Collection:** August 31, 2016 **Sample Effort:** 0745 – 1630 (8.75 hours) **Samplers:** John Negrey and Stephen Martenuk



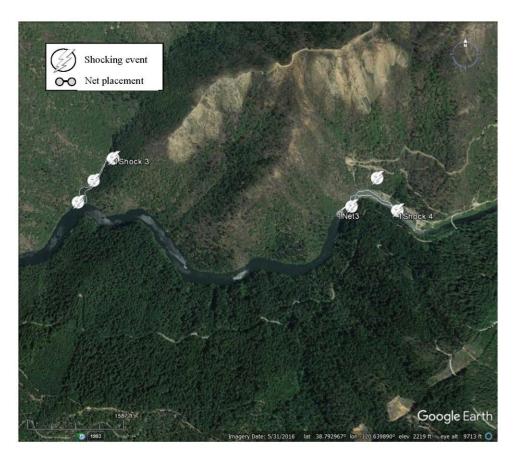


Figure 7b. Slab Creek Reservoir sampling locations.



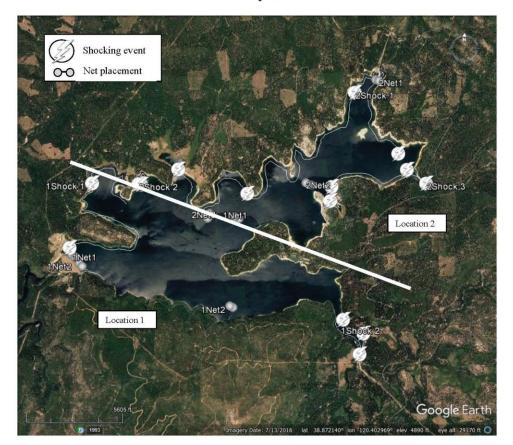


Figure 7c. Slab Creek Reservoir sampling locations.

		Sportfis	h Species	TL (mm)		
	Sacram	iento Pikem	innow (Pty	chocheilus g	grandis)	
219	251	259	309	314	334	481
	Ra	ainbow Trou	ut (Oncorhy	nchus mykis	ss)	
	184	201	206	262		
		Brown	Trout (Salm	o trutta)		
	230	241	386	505		

**Comments:** The sampling vessel was launched from the main launch ramp. Suckers and hardhead were also seen. One pikeminnow and one brown trout were caught in the gill nets, the remainder of the samples were collected electro-fishing. **Back to Table** 





# **Union Valley Reservoir**

Figure 8a. Union Valley Reservoir sampling locations.

Collection Method: Electro-fisher boat, gill net Date(s) of Collection: August 30 & 31, September 1, 2016 Sample Effort: 1345 – 1800, 1515 – 1800, 0830 – 1830, 0730 – 1100 (20.5 hours) Samplers: William Jakl, April Guimaraes, John Negrey and Stephen Martenuk





Figure 8b. Union Valley Reservoir Location 1 sampling locations.

			Spo	ortfish Spe	ecies IL (m	im)			
	~~ ~~ ~~		Smallmou	th Bass (M	icropterus d	dolomieu)			
				180	184	240			
			Rainbow	/ Trout (On	corhynchus	mykiss)			
240	270	280	335	340	340	350	355	372	382
			Lake T	rout (Salve	linus nama	ycush)			
			308	400	420	553	710		
			Koka	nee ( <i>Onco</i> l	hynchus ne	erka )			
					234				



**Comments:** The sampling vessel was launched from the launch ramp by the dam and the Sunset launch ramp. The site was visited a total of three separate days. Multiple gill nets were left overnight. Specimens were collected using both gill nets and electro-fishing.





Figure 8c. Union Valley Reservoir Location 2 sampling locations.

Collection Method: Electro-fisher boat, gill net Date(s) of Collection: September 1, 2016 Sample Effort: 0830 – 1830 (10 hours) Samplers: Stephen Martenuk and April Guimaraes



		Spo	rtfish Spe	cies TL (mi	n)		
		Bro	wn Trout (S	almo trutto	7)		<i>a</i>
			505				
		Rainbow	Trout (Onc	orhynchus i	mykiss )		
231	304	305	315	325	345	348	370
		Kokar	nee ( <i>Oncorl</i>	nynchus nei	·ka)		
		230	234	234			
		Smallmout	th Bass ( <i>Mi</i>	cropterus d	olomieu )		
215	254	255	287	303	349	402	

**Comments:** The sampling vessel was launched from the Yellowjacket boat ramp. Specimens were collected using both gill nets and electro-fishing.



# APPENDIX H QA/QC Summaries for Metals Bioaccumulation Sampling



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Marine Pollution Studies Laboratories Moss Landing Marine Laboratories 7544 Sandholdt Road Moss Landing, CA 95039

Project Manager:	Autumn Bonnema	
Phone:	831-771-4175	
Fax:	831-633-0805	
e-mail:	bonnema@mlml.calstate.edu	
Project Name:	SMUD FERC 2016	M



Project Name:	SMUD_FERC_2016	Matrix:	Tissue
Parameter:	Total mercury	Report Date:	11/7/16

### QA/QC SUMMARY

#### SAMPLE CUSTODY

One hundred and eight tissue samples were collected August 29-September 1, 2016 and were received in good condition on September 2, 2016. Cooler temperature at the time samples were received was -20°C. Samples were stored at -20°C before and after analysis.

#### QA/QC DATA QUALITY OBJECTIVES (DQO)

<u>Analyte</u>	Reference Method	Range of Recovery	Relative Precision	Detection Limit	<u>Reporting</u> <u>Limit</u>
Hg	EPA 7473	±25%	±25%	0.004 µg/g _{wet} 0.016 µg/g _{dry}	0.012 µg/g _{wet} 0.047 µg/g _{dry}

#### METHOD

Samples were analyzed using EPA 7473: Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry.

#### HOLDING TIME

Samples were analyzed October 10 through November 01, 2016. Samples were analyzed within the EPA holding time of 1 year from collection.

### CALIBRATION VERIFICATION

Initial Calibration Verification (ICV) and all Continuing Calibration Verification (CCV) were within DQO of  $\pm 20\%$ .



#### **DETECTION LIMIT**

All detection limits listed in the table above were achieved.

#### **METHOD BLANKS**

Three method blanks were analyzed with each batch samples. All blanks were below detection limits. Sample results are not blank corrected.

#### REPLICATES

One pair of analytical duplicates selected at random was analyzed with each batch of samples. All RPDs met the DQO of  $\pm 25\%$ .

#### MATRIX SPIKES

One matrix spike/matrix spike duplicate (MS/MSD) pair was analyzed with each batch of samples. All recoveries and RPD's were calculated using the mass of Hg on a wet weight basis. All recoveries and RPDs met the DQO of  $\pm 25\%$ 

#### **CERTIFIED REFERENCE MATERIAL**

One CRM DORM-4 was analyzed with each batch of samples. The percent moisture of CRM DORM-4 at the time of analysis was 4.96 and 3.20. Percent moisture of CRM DORM-4 was recorded on 9/2/16 and 10/7/16, respectively. Percent recovery met the DQO of ±25%.

#### COMMENTS

The MDL study was conducted using chicken, known to be clean for Mercury, and calculated on a dry weight basis. The wet weight MDL and RL are calculated using the chicken percent moisture, however the wet weight sample results are converted using the percent moisture of each sample.

#### REFERENCES

US Environmental Protection Agency Method 7473. 1998. Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. US Environmental Protection Agency, Washington, DC.



Marine Pollution Studies Laboratories Moss Landing Marine Laboratories 7544 Sandholdt Road Moss Landing, CA 95039

Project Manager: Autumn Bonnema Phone: 831-771-4175 831-633-0805 Fax: e-mail: bonnema@mlml.calstate.edu SMUD_FERC_2016 **Project Name:** 

Metals



Report Date:

Matrix:

Tissue 19 January 2017

# **QA/QC SUMMARY**

#### SAMPLE CUSTODY

Parameter:

One hundred and eight tissue samples were collected August 29-September 1, 2016 and were received in good condition on September 2, 2016. Cooler temperature at the time samples were received was -20°C. Samples were stored at -20°C before and after analysis.

### QA/QC DATA QUALITY OBJECTIVES (DQO)

<u>Analyte</u>	Reference Method	<u>Range of</u> <u>Recovery</u>	<u>Relative</u> <u>Precision</u>	<u>Detection</u> Limit	<u>Reporting</u> <u>Limit</u>
Ag	EPA 200.8	±25%	±25%	0.003 µg/g _{wet} 0.02 µg/g _{dry}	0.010 µg/g _{wet} 0.06 µg/g _{dry}
Cu	EPA 200.8	±25%	±25%	0.06 µg/g _{wet} 0.34 µg/g _{dry}	0.02 µg/g _{wet} 1.00 µg/g _{dry}
Pb	EPA 200.8	±25%	±25%	0.002 µg/g _{wet} 0.01 µg/g _{dry}	0.005 µg/g _{wet} 0.03 µg/g _{dry}

#### METHOD

Samples were analyzed using digested using EPA 3052 (Modified): Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices, and analyzed using EPA 200.8: Determination of Trace Elements in Ambient Waters and Wastes by ICP-MS.

#### HOLDING TIME

Samples were digested 12-18 December 2016 and analyzed 20 December 2016 through 17 January 2017. Samples were analyzed within the EPA holding time of 1 year from collection.

### CALIBRATION VERIFICATION

Initial Calibration Verification (ICV) and all Continuing Calibration Verification (CCV) were within DQO of ±20%.



#### **DETECTION LIMIT**

All detection limits listed in the table above were achieved.

#### METHOD BLANKS

Three method blanks were analyzed with each batch samples. All blanks were below detection limits. Sample results are not blank corrected.

#### REPLICATES

One pair of analytical duplicates selected at random was analyzed with each batch of samples. All RPDs met the DQO of  $\pm 25\%$ .

#### MATRIX SPIKES

One matrix spike/matrix spike duplicate (MS/MSD) pair was analyzed with each batch of samples. All recoveries and RPDs met the DQO of  $\pm 25\%$ 

#### **CERTIFIED REFERENCE MATERIAL**

One CRM DORM-4 or 2976 was analyzed with each batch of samples. The percent moisture of CRM DORM-4 and 2976 were at the time of analysis was 4.52 and 4.59, respectively. Percent moistures for CRMs were recorded on 8 December 2016.

The certified value for Ag is below the Reporting Limit (RL) therefore a Laboratory Control Spike (LCS) was used instead. There is no percent moisture associated with LCS.

Percent recoveries met the DQO of ±25%.

#### COMMENTS

The MDL study was conducted using chicken, known to be clean for metals, and calculated on a dry weight basis. The wet weight MDL and RL are calculated using the chicken percent moisture, however the wet weight sample results are converted using the percent moisture of each sample.

#### REFERENCES

US Environmental Protection Agency Method 3052. 1996. Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices. US Environmental Protection Agency, Washington, DC.

#### Modifications to EPA 3052

US Environmental Protection Agency Method 200.8 Rev 5.4. 1994. Determination of Trace Elements in Ambient Waters and Wastes by Inductively Coupled Plasma- Mass Spectrometry. US Environmental Protection Agency, Washington, DC.