Caples Lake Main Dam Emergency Repair Project

Water Quality Monitoring Report

August 31, 2009

1.0 Introduction

The Caples Lake Main Dam Emergency Repair Project (Project) Water Quality Monitoring Report (Report) summarizes the results of the water quality monitoring effort conducted pursuant to the Project Water Quality Monitoring Plan (Plan). The Plan was developed to satisfy a request by the United States Forest Service (FS) in their August 18, 2008 letter to the El Dorado Irrigation District (District). This request states:

> *A plan for monitoring downstream water quality during and after the repairs shall be developed that is approved by the Forest Service. It is recommended that monitoring continue until such time as the reservoir refills and flow releases return to the conditions specified in the license*.

The District provided the Plan for FS review and approval on September 3, 2008. The FS provided comments on the Plan in a letter dated September 30, 2008. The District responded to FS comments in a letter dated October 10, 2008. The Plan was revised based on comments from the FS and the California Department of Fish and Game. The FS approved the Plan included in Appendix A by letter on November 25, 2008. The District submitted the approved Plan was submitted to the Federal Regulatory Commission (Commission) on December 5, 2008. The Commission issued an order approving and modifying the Plan on January 14, 2009.

This Report was distributed to the FS, California State Water Resources Control Board (SWRCB), and the Project 184 Ecological Resources Committee (ERC) for review via email on August 6, 2009. The SWRCB provided comments and recommendations via email on August 20, 2009. The SWRCB comments and recommendations are incorporated into this Report. No other comments or recommendations have been received.

2.0 Project Schedule Overview

In situ monitoring for general water quality parameters (temperature, pH, dissolved oxygen, conductivity, and turbidity) commenced on September 22, 2008, coinciding with the installation of by-pass pumping system required to provide minimum streamflows in Caples Creek. Revisions to the monitoring program were implemented on October 20, 2008 following coordination with the FS. The bladder dam was removed on October 26, 2009 and the transition from by-pass pumping to gate operations occurred on October 28, 2009. In situ monitoring for general water quality parameters transitioned from daily to weekly monitoring at Caples Creek on November 6, 2008. The last monitoring event occurred on March 26, 2009.

3.0 Monitoring Results and Discussion

Water quality monitoring data is provided in Appendix B. The Plan required four monitoring locations:

- Caples Lake near the intake of the pump(s) providing bypass flows to Caples Creek (Dam)
- Caples Lake along the eastern margin of the remaining pool (Eastside)

- Caples Creek, below the Main Dam outlet and downstream of the point where bypass flows enter the creek (Outlet)
- Caples Creek below the confluence of the main channel and the spillway channel and above Kirkwood Creek (Meadow)

Monitoring was conducted whenever it was determined to be safe. Winter weather conditions did preclude some monitoring events due to road closures, ice formation, and unsafe access to monitoring locations.

3.1 Water Quality Parameters

Water temperature, conductivity, dissolved oxygen, and pH data were collected using a calibrated YSI 556 multi sensor probe. Water temperature, conductivity, and dissolved oxygen were all within the range of target criteria for all monitoring events at all sample sites. A total of 73 out of 157 measurements of pH levels were recorded below target criteria. Measurements below the target criteria were documented at all sites (range 4.7-7.8; median 6.5). A similar range of pH levels were observed at Caples Creek between March and September 2008 during monitoring for the Project 184 2008 Water Quality Monitoring Plan (range 3.0-6.9; median 6.2).

Depressed pH levels are well documented naturally occurring conditions in the Sierra Nevada. While this condition is usually associated with snowmelt events, Stoddard (1995) notes that Sierra Nevada lakes and streams, as a group, are extremely base-poor and "acid sensitive;" due in part to the geology of the Sierra Nevada, which consists of slowly weathering granitic rock that provides little buffering material to surface waters.

The range and median values for water temperature, conductivity, dissolved oxygen, and pH at each monitoring site summarized in Table 1.

Table 1. Water quality parameter summary

Temperature (ºC)				**pH**			
Site	Min	Max	Median	Site	Min	Max	Median
Dam	3.1	14.8	8.4	Dam	5.5	7.1	6.6
Eastside	2.8	12.8	10.7	Eastside	6.3	7.8	6.8
Outlet	1.7	14.5	7.5	Outlet	4.8	6.9	6.4
Meadow	0.3	8.4	5.5	Meadow	4.7	6.9	6.3
Conductivity (µS/cm)				**Dissolved Oxygen (mg/L)**			
Site	Min	Max	Median	Site	Min	Max	Median
Dam	26	73	35	Dam	8.7	14.5	11.7
Eastside	30	133	40	Eastside	9.3	13.8	12.2
Outlet	27	64	42	Outlet	8.3	15.3	12.5
Meadow	14	46	35	Meadow	11.6	16.0	14.6

3.2 Turbidity Monitoring

The target criteria for turbidity included in the Plan contains four categories based on natural turbidity levels (RWQCB 1998):

1. Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU
2. Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent
3. Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
4. Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent

The range and median values for turbidity measurements at each monitoring site are summarized in Table 2.

Table 2. Minimum, maximum, and median turbidity (NTUs) at all monitoring sites

Site	Min	Max	Median
Dam	3.3	32.4	7.2
Eastside	3.6	83.5	11.8
Outlet	0.0	40.4	8.0
Meadow	0.0	7.5	3.4

Upstream and downstream turbidity measurements were compared to identify events when turbidity levels were out of range of the target criteria (Table 3).

Table 3. Comparison of turbidity (NTUs) measurements between upstream and monitoring sites

Date	Eastside	Dam	Upstream Average (Eastside and Dam)	Outlet	Meadow	Allowable Increase	Difference Upstream Average vs. Outlet	Target Criteria Exceeded (Yes/No)	Notes
9/22/08		7.8	7.8	40.4		1.6	32.6	Yes	By-pass flows begin; dewatering of intervening pool between bladder dam and main dam begins; second fish rescue conducted in intervening pool using backpack electrofishing
9/23/08		5.9	5.9	30.6		1.2	24.7	Yes	Outlet gate closed due to continued high turbidity levels and suspended sediments; check dam filtration system installed in outlet works; secondary pump system installed to pump leakage water from the bladder dam back upstream through filter bag
9/25/08		12.6	12.6	24.7		2.5	12.1	Yes	Opened outlet gate following installation of remediation measures to complete dewatering of intervening pool; established water control and isolated outlet works
9/26/08		13.9	13.9	15.8		2.8	1.9	No	No in-water activities
9/29/08		4.6	4.6	10.7		0.9	6.1	Yes	No in-water activities; rain
9/30/08		6.4	6.4	15.1		1.3	8.7	Yes	No in-water activities
10/1/08		12.8	12.8	14.6		2.6	1.8	No	No in-water activities
10/2/08		10.0	10.0	14		2.0	4.0	Yes	No in-water activities; light rain
10/3/08		6.3	6.3	9.3		1.3	3.0	Yes	No in-water activities; light rain
10/6/08		19.0	19.0	10.3		3.8	-8.7	No	No in-water activities
10/7/08		4.1	4.1	6.8		1.0	2.7	Yes	No in-water activities
10/8/08		4.4	4.4	6.3		1.0	1.9	Yes	Turbidity meter malfunction; grab samples collected and analyzed in lab
10/9/08		5.5	5.5	8		1.1	2.5	Yes	No in-water activities
10/10/08		5.6	5.6	8.1		1.1	2.5	Yes	No in-water activities; snow
10/14/08		9.4	9.4	12		1.9	2.6	Yes	No in-water activities
10/15/08		5.3	5.3	8.6		1.1	3.3	Yes	No in-water activities
10/16/08		5.8	5.8	6.3		1.2	0.5	No	No in-water activities
10/17/08		4.6	4.6	7.8		0.9	3.2	Yes	No in-water activities
10/20/08	15.0	13.9	14.5	8.8	3	2.8	-5.7	No	No in-water activities; begin implementation of revised monitoring plan
10/21/08	18.1	5.7	11.9	7.4	3.4	1.1	-4.5	No	No in-water activities
10/22/08	13.0	12.1	12.6	17	4.6	2.4	4.5	Yes	No in-water activities
10/23/08	4.6	6.2	5.4	8.2	4.6	1.2	2.8	Yes	Begin pumping from lake to re-water intervening pool as measure to prevent turbidity upon removal of bladder dam
10/24/08	3.9	4.2	4.1	5.2	2.7	1.0	1.2	Yes	No in-water activities
10/25/08	7.9	5.2	6.6	3.4	2.1	1.0	-3.2	No	No in-water activities
10/26/08	6.6	6.7	6.7	5.5	3.2	1.3	-1.2	No	Coordinate preventative measures, in consultation with FS, to minimize turbidity during bladder dam removal; bladder dam removed;
10/27/08	15.4	7.0	11.2	5.9	3.2	1.4	-5.3	No	No in-water activities
10/28/08	16.4	7.2	11.8	16	4.3	1.4	4.2	Yes	Transition from by-pass pumping to gate operations; by-pass pump system removed; no further in water activities
10/29/08	8.1	21.7	14.9	12.1	6	4.3	-2.8	No	
10/30/08	22.0	9.5	15.8	11.3	6.3	1.9	-4.5	No	All construction materials / equipment demobilized from lakebed
10/31/08	52.2	11.1	31.7	10.7	6.7	2.2	-21.0	No	
11/3/08	32.4	13.1	22.8	15.7	7.5	2.6	-7.1	No	
11/6/08				14.1	7.5				Continue post-project monitoring at Caples Creek sites
11/14/08				4	1.2				
11/19/08				3.2	3.5				
11/26/08				3	0.7				
12/4/08				3.5	0.6				
12/11/08				2.1	1.1				
12/18/08				2.5	0.4				
1/7/09				0.6	No Data				
1/14/09				0	0				
1/21/09				0.1	0				
2/5/09				0					Significant snow accumulation prevents site access during most of February
3/11/09				1.6					
3/20/09				1.4					
3/26/09				1.6					Final monitoring event

Turbidity levels exceeded target criteria primarily during the dewatering of the intervening pool between the bladder dam and main dam. Upon observation of high turbidity levels during the dewatering of the intervening pool and concurrent fish rescue, the outlet gate was closed. Before the outlet gate was re-opened, several actions were implemented to minimize the potential for increased turbidity in Caples Creek during the dewatering of the intervening pool including: 1) expedited installation of the secondary pump system to pump leakage water from the bladder dam back upstream through a filter bag and 2) development and installation of a check dam equipped with a filter bag in the outlet works. Turbidity levels measured at the Outlet decreased following installation of these systems. Throughout the remainder of the Project, there were only minor increases in turbidity levels observed between upstream and downstream sites.

Turbidity levels observed at the Eastside site was highly variable (Table 2). Turbidity levels at the Eastside site were strongly influenced by wind and wave action that mobilized fine sediments in the shallow water near the shore.

The SWRCB provided comments and recommendations on the August 6, 2009 version of this Report (Appendix C). The SWRCB requested the Report contain a short discussion of the requirements included in the Project 401 Water Quality Certification (WQC) regarding actions that need to occur if visible plumes are observed downstream of the Outlet. Condition 20 of the Project WQC states "In the event that Project activities result in the deposition of soil material or creation of a visible plume in surface waters outside of the work area, field grab samples for turbidity shall be collected every 4 hours, 100 feet upstream and 300 feet downstream of the work area, until such time as the plume is no longer visible." Following the dewatering of the intervening pool between the bladder dam and main dam, no visible plumes were evident at the Outlet. However, turbidity levels measured at the Outlet did exceed the allowable increase when compared to background levels measured at the Dam and Eastside sites. While no visible plumes were observed at the Outlet, additional monitoring pursuant to WQC Condition 20 may have been warranted for these events.

3.3 Petroleum Monitoring

Petroleum samples were collected for detection of diesel and gasoline between October 20, 2008 and October 31, 2008. All samples were non-detect for total petroleum hydrocarbons (TPH) diesel and gasoline ranges. Monitoring for petroleum products was discontinued after October 31, 2008 because laboratory analyses indicated no presence of petroleum products for five consecutive days after removal of the bladder dam.

4.0 Conclusion

The results of this monitoring effort indicate that the water quality parameters water temperature, conductivity, and dissolved oxygen were maintained within the specified target criteria identified in the Plan. However, pH and turbidity levels were observed out of range of the specified target criteria.

The depressed pH levels observed during Project monitoring events are the result of naturally occurring condition that is associated with the low buffering capacity of Sierra Nevada soils and waters.

Turbidity levels in Caples Creek exceeded target criteria during the dewatering of the intervening pool between the bladder dam and main dam. The increased turbidity levels were a temporary condition and turbidity levels decreased rapidly when in water activities ceased and corrective measures were implemented. There were no reported adverse environmental impacts resulting from elevated turbidity levels during the dewatering of the intervening pool.

All water samples were non-detect for total petroleum hydrocarbons (TPH) diesel and gasoline ranges.

5.0 Literature Cited

Central Valley Region Basin Plan. Central Valley Regional Water Quality Control Board (RWQCB). 1998.

Project 184 2008 Water Quality Monitoring Report, February 26, 2009

Stoddard, J.L. 1995. Episodic acidification during snowmelt of high elevation lakes in the Sierra Nevada Mountains of California. Water, Air, and Soil Pollution Volume 85 (introduction). 1995.

APPENDIX A

WATER QUALITY MONITORING PLAN

Caples Lake Main Dam Emergency Repair Project
Water Quality Monitoring Plan

November 18, 2008

The Caples Lake Main Dam Emergency Repair Project Water Quality Monitoring Plan (Plan) outlines water quality monitoring for Caples Lake and Caples Creek during and following the Caples Lake Main Dam emergency repairs. The Plan has been developed to satisfy a request by the United States Forest Service (FS) in their August 18, 2008 letter (FS 2008) to the El Dorado Irrigation District (EID) in response to the proposed emergency repairs at Caples Lake. This request states:

> *A Plan for monitoring of downstream water quality during and after repairs shall be developed that is approved by the FS. It is recommended that monitoring continue until such a time as the reservoir refills and flow releases return to conditions specified in the license* (FS 2008),

In addition to satisfying the FS request, this Plan was developed to demonstrate compliance with the *Central Valley Region Basin Plan* (CVRWQCB 1998), FERC Project 184 License (FERC 2006), Relicensing Settlement Agreement (EID 2003), FS 4(e) Conditions for Project 184 (FS 2003a), and the State Water Resources Control Board (SWRCB) Water Quality Certification for Project 184 (SWRCB 2006).

This Plan has been revised to incorporate comments and clarifications received from the FS and DFG (FS 2008a, EID 2008a, and FS 2008b).

1.0 Background

Caples Lake is part of FERC Project 184-CA, which also includes El Dorado Forebay, Silver Lake, Lake Aloha, and Echo Lake. These dams are also under the jurisdiction of California Department of Water Resources Division of Safety of Dams (DSOD No. 53-13). Caples Lake is formed by a Main Dam and an Auxiliary Dam, located about 0.8 mile apart. The Main Dam is on Caples Creek and the Auxiliary Dam is on a small, unnamed branch of Caples Creek southwest of the Main Dam. The reservoir serves the primary function of storing spring snowmelt runoff and releasing it throughout the year to serve power generation commitments downstream. Caples Lake also supports recreational uses (EID 2008).

FS 4(e) Condition 30 states that EID "must comply with state water quality standards to ensure compliance with the Clean Water Act, protection of beneficial uses, and adequate protection during utilization of the Forests". Condition 30 goes on to state that EID "shall discharge no waste or byproduct on or affecting National Forest System lands if it contains any substances in concentrations that would result in violation of water quality standards set forth by the State; would impair present or future beneficial uses of water; would cause pollution, nuisance, or contamination; or would unreasonably degrade the quality of any waters in violation of any federal or state law". FS Rationale for water quality states that EID must "ensure that water affected by Project operations meets water quality criteria such as temperature to protect designated beneficial uses as determined by the Central Valley and Lahontan Regional Water Quality Control Board Basin Plans and through SWRCB's Clean Water Act Section 401 water quality certification authority and other applicable state laws and resource agency mandates" (USFS 2003b).

A deviation from minimum streamflow requirements is required for Caples Creek during and after the emergency repairs. During the repairs, bypass pumps (capacity up to 5 cfs) will be installed to provide streamflows to Caples Creek. After the repairs are completed, streamflows will be provided through the Caples Lake Main Dam. After construction is complete, it is uncertain when the license required streamflows will be restored to Caples Creek.

Water quality parameters including water temperature, turbidity, conductivity, dissolved oxygen, and pH be monitored in situ at selected monitoring sites. Additionally, grab samples will be collected to monitor for detection of petroleum products.

2.0 Study Plan Objectives

1. Characterize the water quality at designated locations within Caples Lake and Caples Creek during the emergency repairs and following the release of water impounded by the temporary bladder dams.

2. Determine if the emergency repairs affect the ability to meet water quality objectives of the *Central Valley Region Basin Plan* for water temperature, turbidity, conductivity, dissolved oxygen, pH, and petroleum products (oil and grease).

3.0 Study Area and Sampling Locations

Sampling locations were chosen based on the bypass pump configuration during the emergency repairs and the post-project setting without bypass flows. The sites were selected based on their sensitivity to the emergency repairs and Project 184 operation activities. The four monitoring locations are listed below and depicted in Figure 1:

- Site 1: Caples Lake near the intake of the pump(s) providing bypass flows to Caples Creek

- Site 2: Caples Lake along the eastern margin of the remaining pool

- Site 3: Caples Creek, below the Main Dam outlet and downstream of the point where bypass flows enter the creek

- Site 4: Caples Creek below the confluence of the main channel and the spillway channel and above Kirkwood Creek

4.0 Data Collection

Water quality samples will be taken at the above identified monitoring sites at Caples Lake and Caples Creek. All water quality data information will be recorded in the field utilizing a standard data collection field sheet (Attachment 1), and then transferred to a

spreadsheet at the EID headquarters office. The following sections describe methods of collecting data for this Plan.

4.1 Sample Field Parameters

Water quality parameters including temperature, dissolved oxygen, turbidity, conductivity, and pH will be measured at all of the identified sampling locations during and after the emergency repairs using a calibrated multi sensor probe (YSI 556 or equivalent). Probes will be calibrated prior to each field visit according to manufacturer specifications. Additionally, the probe will be calibrated to track changes in the barometric pressure prior to sampling to adjust for changes in elevation. Immediately following sample collection, the sampling technician will document local influences (stream clarity, weather, and other pertinent notes) and take a photo of the sample site to document conditions at the time of sampling. Equipment performance standards will be updated based on a review of current available technology that is economically achievable.

Observations will be made and recorded to document any visible film or coating on the water surface that would suggest oil, grease, or other petroleum residues. The following methods will be used for monitoring this parameter:

- Observations shall be made at each sampling site, both morning and mid-afternoon, to identify and report presence or absence of oily surface sheen or other indicators of grease or petroleum products.
- One grab sample shall be taken daily (mid-afternoon) from the Caples Creek water column immediately downstream of pumped bypass flow delivery below Caples Dam. Additional grab sample(s) shall be taken at any sampling station(s) where oily sheen has been observed. Grab samples shall be stored at 4 degrees C and delivered within 3 days for laboratory analysis using modified EPA Method 8015 for TPH (Diesel range) and TPH (Gasoline range).

The FS will consider discontinuing the grab sampling effort one week after the bladder dam is removed if laboratory analyses indicate no presence of petroleum products for 5 consecutive days.

If the deviation from minimum streamflows continues after June 1, 2009, a continuous recording thermograph will be installed in Caples Creek at Site 4 to monitor water temperatures.

4.2 Water Quality Criteria

Target criteria for each of the parameters above is identified in Table 1.

Table 1Target criteria for each water quality parameter from the *Central Valley Region Basin Plan* (CVRWQCB 1998)

Parameter	Target Criteria
Water Temperature	Water temperature shall not increase by more than 5 degrees above natural receiving water temperatures
Conductivity	<186 µS/cm *
Dissolved Oxygen	> 7 mg/L
pH	6.5 – 8.5
Turbidity	Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU. Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent. Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs. Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.
Petroleum products	Detect or non-detect for TPH (gasoline) and TPH (diesel)

* No specific water quality criteria are identified in the Basin Plan for electrical conductivity. However, the Basin Plan does establish criteria for total dissolved solids as 125 ppm. The value for electrical conductivity included in Table 1 was calculated as follows: electrical conductivity = Total Dissolved Solids (ppm) / 0.67.

4.3 Quality Assurance and Quality Control (QA/QC)

Field QA/QC methods will be uniformly applied to all field sampling. Clean sampling techniques will be applied throughout the sampling effort. Quality control in the field will be assured by accurate and thoroughly completed field sheets.

5.0 Reporting

All of the data collection described in Section 4 will be recorded on a standardized data form to be used during each monitoring event for easy comparison (Attachment 1). Following each monitoring event, data will be entered into a spreadsheet. A report will be prepared summarizing results from all monitoring events and comparing reservoir and stream conditions during and after the emergency repairs. This report will be submitted to all appropriate agencies for their review. The licensee will notify the FS and other appropriate agencies if any parameters exceed water quality standards.

6.0 Schedule

The water quality monitoring will occur morning and afternoon each day starting as soon as possible following installation of the bladder dam and will continue until completion of construction and removal of the bladder dam.[1] Post-construction water quality sampling will continue in Caples Creek once weekly until the reservoir reaches target lake levels or minimum streamflow releases specified in the license.[2] If minimum streamflows required in the FERC license are met and the reservoir has not yet refilled to 10,000 acre-feet, collected water quality data will be reviewed to determine if monitoring can be discontinued or if monitoring shall continue until the reservoir refills to 10,000 acre-feet. The licensee will notify the FS and other appropriate agencies during situations when sampling becomes a safety hazard or accessibility is problematic.

[1] Daily monitoring (once per day) at Site 1 and Site 3 began on September 22, 2008. Daily monitoring (twice per day) began at all sites on October 20, 2008.
[2] Weekly monitoring at Site 3 and Site 4 began on November 3, 2008.

7.0 Literature Cited

(CVRWQCB 1998) Central Valley Region Basin Plan. Central Valley Regional Water Quality Control Board. 1998.

(EID 2003) El Dorado Relicensing Settlement Agreement. El Dorado FERC Project 184. EID. 2003.

(EID 2006) FERC Order Issuing New License – Project 184

(EID 2007) FERC Project 184 Water Quality Monitoring Plan. EID. March 8, 2007.

(EID 2008) FERC Project 184, DSOD Dam No. 53-13, Caples Lake Outlet Emergency Repairs Project Description. EID. August 2008.

(EID 2008a) Letter from EID to FS regarding Caples Lake Main Dam Outlet Works Emergency Repair Project Monitoring Plans, October 10, 2008.

(FS 2008) Letter from FS to EID regarding Caples Lake Outlet Emergency Repairs Project Description. August 18, 2008.

(FS 2008a) Letter from FS to EID regarding Caples Lake Outlet Emergency Repairs Project Description. September 30, 2008.

(FS 2008b) Email from Beth Paulson (FS) to Brian Deason regarding Water Quality Monitoring Plan, October 16, 2008.

(FS 2003a) FS Final Terms and Conditions In Connection with the Application for Relicensing of The El Dorado Hydroelectric Project (FERC No. 184). USFS. October 31, 2003.

(FS 2003b) El Dorado Hydroelectric Project FERC No. 184, Rationale Report for Final Section 4(e) Conditions. USFS. October 31, 2003.

(SWRCB 2006) State Water Resources Control Board (SWRCB) Water Quality Certification for Project 184

Field Data Sheet for Water Quality Monitoring: EID – Caples emergency Repairs

Date: _____

Waterbody Name: _____

Station ID: _____

Time : _____

Personnel:	Weather in past 24 hours (circle): Storm: rain; showers; overcast; partly cloudy; clear and sunny
	Weather currently (circle): Storm: rain; showers; overcast; partly cloudy; clear and sunny

Observations: *Circle the appropriate observations below:*

Cloud Cover	no clouds; partly cloudy; cloudy sky (overcast)	Site elevation and additional observations:
Precipitation	none; misty; foggy; drizzle; rain; snow	
Wind	calm; breezy; windy	
Water Murkiness	clear water; cloudy water (>4" visibility); murky (<4" visibility) [this pertains to the water itself, not to scum]	
Petroleum residue:	None; oily sheen Describe (sq. ft., source, location):	

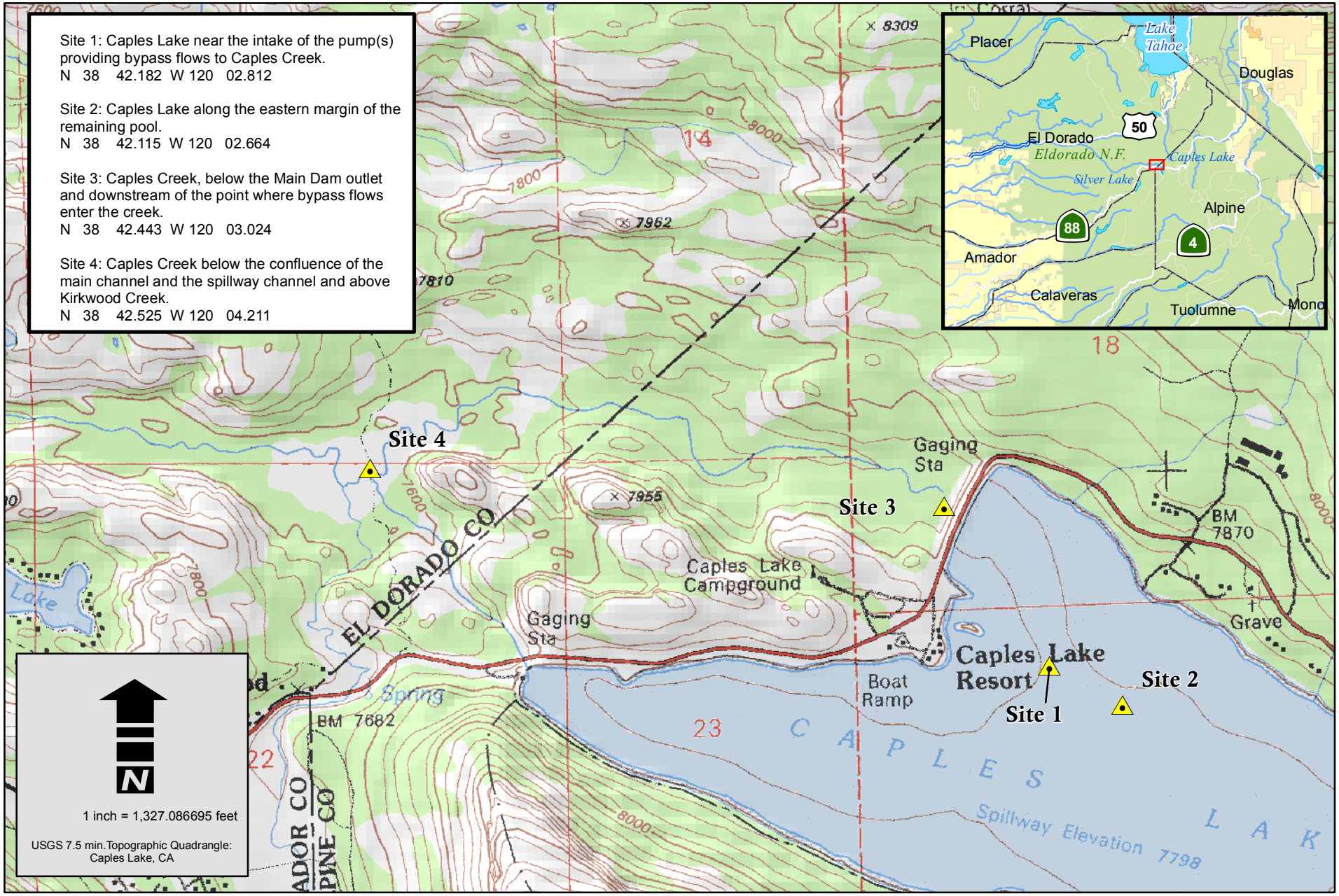
Water Quality Measurements:

Instrument ID	Parameter (Charcteristic)	Unit	Measurement/ Sample Depth	Result	Comments
YSI 556	Water Temperature	^{o}C	Mid-column		
YSI 556	Conductivity	µS/cm	Mid-column		
YSI 556	Dissolved Oxygen (DO) %		Mid-column		
YSI 556	Dissolved Oxygen (DO)	mg/l (ppm)	Mid-column		
YSI 556	pH	pH	Mid-column		
YSI 556	pH	pHvM	Mid-column		

Instrument ID	Parameter (Characteristic)	Unit	Measurement/ Sample Depth	Result #1	Result #2	Result #3	Average for Results	Comments
Hach 2100P	Turbidity	NTU	Mid-column					

Photo Log – 3 Pictures

Done (check)	Location
	Upstream
	Downstream
	Sample site
	Other



Created By: Ethan Koenigs
Date: 11/20/08

C:\GIS Data\Projects\2008\Caples_repair_plans\Final_plan_map\Site_loc_WQ_112008.mxd

Figure 1. Monitoring Locations

Caples Lake Outlet Emergency Repair Project
Water Quality Monitoring Plan

El Dorado Irrigation District

ENZ RESOURCES, INC. planning and environmental consulting services

APPENDIX B

MONITORING DATA

CAPLES LAKE EMERGENCY REPAIRS - WATER QUALITY MONITORING DATA

Date	Site	Time	Temperature (ºC)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Average Turbidity (NTU)	TPH (Gas/Diesel)
9/22/2008	Dam	15:04	14.8	29	10.18	6.34	7.8	
9/22/2008	Outlet	14:21	13.9	32	9.93	6.32	40.4	
9/23/2008	Dam	11:58	12.8	26	9.74	6.29	5.9	
9/23/2008	Outlet	10:55	12.5	64	10.47	6.38	30.6	
9/24/2009	No data collected due to miscommunication regarding location of equipment							
9/25/2008	Dam	11:30	12.9	31	11.05	6.27	12.6	
9/25/2008	Outlet	12:00	14.3	50	10.2	6.44	24.7	
9/26/2008	Dam	11:40	13.4	30	10.55	6.07	13.9	
9/26/2008	Outlet	11:00	13.6	37	9.87	6.1	15.8	
9/29/2008	Dam	10:29	13.2	30	10.75	6.37	4.6	
9/29/2008	Outlet	9:49	12.6	45	10.5	5.64	10.7	
9/30/2008	Dam	11:00	13.5	32	9.64	6.68	6.4	
9/30/2008	Outlet	10:14	12.8	34	9.71	6.08	15.1	
10/1/2008	Dam	11:05	13.6	32	9.93	6.6	12.8	
10/1/2008	Outlet	12:10	14.5	46	8.27	6.9	14.6	
10/2/2008	Dam	10:05	12.8	44	8.67	6.59	10.0	
10/2/2008	Outlet	10:19	13.7	43	9.15	6.65	14.0	
10/3/2008	Dam	11:15	11.8	36	8.89	6.67	6.3	
10/3/2008	Outlet	11:48	12.0	42	9.79	6.86	9.3	
10/6/2008	Dam	12:55	10.7	73	9.39	6.51	19.0	
10/6/2008	Outlet	12:07	11.1	46	10.99	6.55	10.3	
10/7/2008	Dam	11:42	11.0	41	9.2	6.69	4.1	
10/7/2008	Outlet		11.1	46	10.66	6.88	6.8	
10/8/2008	Dam	10:35	10.8	32	9.83	6.79	4.4	
10/8/2008	Outlet	9:58	10.6	41	11.29	6.76	6.3	
10/9/2008	Dam	11:32	10.2	41	10.04	6.63	5.5	
10/9/2008	Outlet	11:10	10.5	51	10.68	6.76	8.0	
10/10/2008	Dam	9:40	7.9	39	9.6	7	5.6	
10/10/2008	Outlet	9:11	7.9	45	11.82	6.92	8.1	
10/14/2008	Dam	11:48	3.1	39	13.04	6.49	9.4	
10/14/2008	Outlet	11:15	4.4	48	13.13	6.28	12.0	
10/15/2008	Dam	10:39	4.4	35	12.52	6.5	5.3	
10/15/2008	Outlet	10:18	4.9	48	12.93	6.3	8.6	
10/16/2008	Dam	10:28	5.4	39	14.53	5.46	5.8	
10/16/2008	Outlet	11:12	6.6	42	14.18	6.37	6.3	
10/17/2008	Dam	10:39	6.8	35	13.37	6.42	4.6	
10/17/2008	Outlet	10:09	6.7	43	13.93	6.55	7.8	
10/20/2008	Eastside	12:20	12.7	47	10.79	6.93	11.0	
10/20/2008	Dam	12:40	7.7	70	10.83	6.62	15.3	
10/20/2008	Outlet	11:57	7.7	48	11.6	6.87	10.6	
10/20/2008	Meadow	11:16	4.8	45	12.28	6.86	3.0	
10/20/2008	Eastside	15:28	12.3	36	10.62	7	19.1	
10/20/2008	Dam	15:12	8.1	63	11.03	6.56	12.5	
10/20/2008	Outlet	14:45	8.5	42	11.42	6.93	7.1	ND/ND
10/20/2008	Meadow	14:09	7.3	45	13.32	6.32	3.1	
10/21/2008	Eastside	10:28	7.3	49	11.88	6.81	13.0	
10/21/2008	Dam	10:10	6.7	42	11.49	6.65	4.4	
10/21/2008	Outlet	9:46	7.2	46	11.89	6.22	6.7	
10/21/2008	Meadow	11:30	5.2	46	13.64	6.52	3.4	
10/21/2008	Eastside	13:45	12.0	60	10.53	7.8	23.1	
10/21/2008	Dam	13:20	8.3	49	11.62	6.82	6.9	
10/21/2008	Outlet	12:46	8.8	45	11.38	6.45	8.2	ND/ND
10/21/2008	Meadow	14:37	7.2	41	13.42	6.61	3.4	
10/22/2008	Eastside	10:06	5.1	40	12.91	6.75	11.23	
10/22/2008	Dam	9:46	5.4	43	11.74	6.09	11.33	

Date	Site	Time	Temperature (ºC)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Average Turbidity (NTU)	TPH (Gas/Diesel)
10/22/2008	Outlet	9:20	5.9	46	12.48	6.73	15.90	
10/22/2008	Meadow	10:50	5.5	46	12.88	6.58	4.57	
10/22/2008	Eastside	13:54	10.4	35	13.46	6.81	14.83	
10/22/2008	Dam	13:38	7.2	42	13.46	6.28	12.90	
10/22/2008	Outlet	14:27	8.5	43	13.59	6.45	18.17	ND/No data
10/22/2008	Meadow	13:04	7.3	44	15.71	5.26	4.53	
10/23/2008	Eastside	12:08	12.49	40	12.6	6.86	3.9	
10/23/2008	Dam	11:49	7.14	39	13.2	6.26	6.8	
10/23/2008	Outlet	10:20	7.02	42	14.0	6.34	8.2	
10/23/2008	Meadow	11:03	5.22	46	15.4	6.06	4.6	
10/23/2008	Eastside	14:38	11.78	30	12.3	7.02	5.2	
10/23/2008	Dam	14:17	7.7	39	13.37		5.6	
10/23/2008	Outlet	15:11	7.98	31	15.33	6.09	8.2	ND/ND
10/23/2008	Meadow	13:39	7.33	45	15.75		4.6	
10/24/2008	Eastside	10:47	8.12	38	12.28	6.93	3.6	
10/24/2008	Dam	10:25	6.92	33	12.85	6.28	4.9	
10/24/2008	Outlet	10:02	6.97	32	14.14	6.74	6.4	
10/24/2008	Meadow	11:36	5.16	33	15.95	5.52	2.7	
10/24/2008	Eastside	13:55	12.4	33	12.19	6.87	4.2	
10/24/2008	Dam	13:30	9.2	33	12.48	6.61	3.5	
10/24/2008	Outlet	15:16	8.29	28	13.5	5.62	4.1	ND/ND
10/24/2008	Meadow	14:33	7.09	33	15.27	6.56	2.7	
10/25/2008	Eastside	11:57	12.1	47	12.61	6.71	4.0	
10/25/2008	Dam	11:32	8.37	33	11.89	6.33	7.2	
10/25/2008	Outlet	11:05	8.05	32	13.3	6.28	3.0	
10/25/2008	Meadow	12:35	6.58	33	14.7	6.52	1.9	
10/25/2008	Eastside	14:58	12.7	33	11.81	6.87	11.8	
10/25/2008	Dam	14:40	7.85	32	13.52	6.56	3.3	
10/25/2008	Outlet	14:06	8.63	32	13.04	4.79	3.8	ND/ND
10/25/2008	Meadow	15:31	7.92	30	14.7	4.83	2.3	
10/26/2008	Eastside	11:20	9.9	50	12.06	6.26	6.2	
10/26/2008	Dam	10:28	7.46	33	12.66	6.3	6.2	
10/26/2008	Outlet	9:40	7.97	31	12.99	6.48	5.3	
10/26/2008	Meadow	12:13	6.72	27	14.59	6.43	3.3	
10/26/2008	Eastside	15:27	12.43	63	12.06	6.95	6.9	
10/26/2008	Dam	15:12	9.18	35	12.33	6.62	7.2	
10/26/2008	Outlet	14:35	9.77	29	12.6	5.87	5.6	ND/ND
10/26/2008	Meadow	16:23	8.4	31	14.5	6.49	3.1	
10/27/2008	Eastside	13:50	10.68	64	11.74	6.84	21.6	
10/27/2008	Dam	13:32	8.46	36	12.82	6.78	7.5	
10/27/2008	Outlet	12:20	8.86	34	12.96	6.09	6.4	
10/27/2008	Meadow	14:44	7.42	32	15.26	6.32	3.2	
10/27/2008	Eastside	17:20	11.3	49	11.31	7.06	9.2	
10/27/2008	Dam	17:06	9.31	37	12.54	6.77	6.4	
10/27/2008	Outlet	16:22	9.82	34	12.53	6.5	5.3	ND/ND
10/27/2008	Meadow	No data collected - too late in day to safely access site						
10/28/2008	Eastside	11:52	10.51	35	12.28	6.8	17.4	
10/28/2008	Dam	11:33	8.51	35	13.14	6.67	8.4	
10/28/2008	Outlet	10:55	8.51	27	13.21	6.41	17.2	
10/28/2008	Meadow	13:02	7.51	27	14.85	5.6	4.0	
10/28/2008	Eastside	14:07	11.81	32	11.91	6.74	15.3	
10/28/2008	Dam	13:55	9.2	34	12.83	7.03	5.9	
10/28/2008	Outlet	14:22	7.86	36	13.06	6.64	14.8	ND/ND
10/28/2008	Meadow	15:17	8.18	33	14.5	6.31	4.5	
10/29/2008	Eastside	10:10	9.55	133	9.26	6.52	4	
10/29/2008	Dam	10:37	8.92	36	11.71	6.83	32.4	
10/29/2008	Outlet	9:41	7.52	35	13.06	6.65	12.5	
10/29/2008	Meadow	11:33	5.51	37	14.68	6.1	6.2	
10/29/2008	Eastside	13:00	12.8	35	12.17	6.7	12.3	
10/29/2008	Dam	13:24	9.78	35	11.35	6.05	10.9	
10/29/2008	Outlet	14:47	7.53	35	13.35	6.64	11.7	ND/ND
10/29/2008	Meadow	14:02	6.75	36	15.23	5.97	5.8	
10/30/2008	Eastside	10:50	8.37	53	12.33	6.63	5.9	
10/30/2008	Dam	10:15	7.8	35	11.51	7.12	10.8	
10/30/2008	Outlet	9:58	7.48	35	13.3	6.85	11.4	
10/30/2008	Meadow	11:29	5.5	35	15.08	6.53	6.6	
10/30/2008	Eastside	14:23	7.84	42	12.03	6.33	38.1	
10/30/2008	Dam	14:00	8.07	33	12.59	6.36	8.1	
10/30/2008	Outlet	13:25	7.81	33	12.49	5.9	11.2	ND/ND
10/30/2008	Meadow	15:00	6.45	32	14.56	4.65	5.9	
10/31/2008	Eastside	10:31	5.46	32	13.3	6.41	83.5	
10/31/2008	Dam	10:06	6.48	32	12.68	6.83	12.1	
10/31/2008	Outlet	9:49	6.36	32	13.15	6.02	9.8	
10/31/2008	Meadow	11:03	6.33	32	13.67	6.22	7.2	
10/31/2008	Eastside	14:02	7.2	38	12.58	6.28	20.8	
10/31/2008	Dam	14:31	6.9	32	12.85	5.8	10.2	
10/31/2008	Outlet	14:58	6.81	32	13.14	6.22	11.6	ND/ND
10/31/2008	Meadow	13:19	7.08	32	13.78	4.68	6.2	

Date	Site	Time	Temperature (ºC)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Average Turbidity (NTU)	TPH (Gas/Diesel)
11/3/2008	Eastside	10:55	2.76	32	13.79	6.29	32.4	
11/3/2008	Dam	10:25	3.68	31	13.6	6.54	13.1	
11/3/2008	Outlet	10:02	3.46	30	14.42	5.29	15.7	
11/3/2008	Meadow	11:52	3.31	30	15.11	6.3	7.5	
11/3/2008	Eastside	No data collected in afternoon due to winter weather conditions						
11/3/2008	Dam							
11/3/2008	Outlet							
11/3/2008	Meadow							
11/6/2008	Outlet	13:44	3.49	33	12.91	5.57	14.1	
11/6/2008	Meadow	14:30	4.09	33	12.81		7.5	
11/14/2008	Outlet	11:05	4.54	36	14.1	5.8	4.0	
11/14/2008	Meadow	13:25	5.36	34	11.6	5.99	1.2	
11/19/2008	Outlet	8:37	4.7	38	11.65	6.28	3.2	
11/19/2008	Meadow	12:50	4.18	14	12.04	6.65	3.5	
11/26/2008	Outlet	10:16	3.75	38	12.02	6.52	3.0	
11/26/2008	Meadow	9:42	3.08	36	11.64	6.16	0.7	
12/4/2008	Outlet	10:45	3.31	39	11.92	6.83	3.5	
12/4/2008	Meadow		1.32	39	12.72	6.8	0.6	
12/11/2008	Outlet	10:20	4.15	39	13.49	6.43	2.1	
12/11/2008	Meadow	11:30	1.88	39	13.31	6.39	1.1	
12/18/2008	Outlet	11:00	3.38	39	13.34	6.45	2.5	
12/18/2008	Meadow	12:15	0.3	40	15.12	6.12	0.4	
1/7/2009	Outlet	11:00	2.13	42	13.27	6.02	0.6	
1/7/2009	Meadow	No data collected						
1/14/2009	Outlet	10:40	2.33	46	12	6.02	0	
1/14/2009	Meadow	12:10	0.91	42	14.31	6.26	0	
1/21/2009	Outlet		2.15	43	12.97	6.43	0.1	
1/21/2009	Meadow		0.4	39	15.12	6.08	0	
1/28/2009	Outlet		2.23	49	13.74	5.9	0	
2/5/2009	Outlet		2.23	51	12.44	6.33	0	
2/12/2009	Outlet	No data colected due to large amounts of accumulated snow and unsafe access to monitoring location						
2/19/2009	Outlet							
2/26/2009	Outlet							
3/5/2009	Outlet	15:30	2.12	51	10.12	6.66	2	
3/11/2009	Outlet	11:30	2.21	51	10.08	6.59	1.6	
3/20/2009	Outlet	11:15	19:55	48	9.82	6.65	1.4	
3/26/2009	Outlet		1.65	48	10.5	6.65	1.6	

APPENDIX C

COMMENTS AND RECOMMENDATIONS

Deason, Brian

From: Deason, Brian
Sent: Friday, August 28, 2009 10:29 AM
To: 'Jennifer Watts'
Subject: RE: Caples Emergency Repairs Water Quality Report

Hi Jennifer,

Thank you for the comments on the Caples WQ Monitoring Report. I will incorporate your comments regarding the 401 WQC requirements in the final report. I did want to provide some additional info to address your comment regarding whether it is appropriate to average the two reservoir locations. The main reason I use an average of the dam and eastside sites is because I saw a lot of variability in the reservoir turbidity levels depending on wind and wave conditions. I thought an average better reflected the overall background turbidity in the reservoir. To address your comment, I compared the data by looking at whether the number of times the target criteria was exceeded differed between 1) dam vs. outlet and 2) average of dam and eastside locations vs. outlet. This comparison is pasted below - I highlighted the two occasions when the upstream average vs. dam site affected whether the target criteria was exceeded. The total number of times the target criteria was exceeded does not change between these two scenarios.

Thank you again for the comments. Please let me know if you have any questions.

Change Dam vs Outlet	Target Criteria Exceeded Dam vs Outlet	Change Upstream Average vs Outlet	Target Criteria Exceeded Upstream Average vs Outlet
32.6	Yes	32.6	Yes
24.7	Yes	24.7	Yes
12.1	Yes	12.1	Yes
1.9	No	1.9	No
6.1	Yes	6.1	Yes
8.7	Yes	8.7	Yes
1.8	No	1.8	No
4.0	Yes	4.0	Yes
3.0	Yes	3.0	Yes
-8.7	No	-8.7	No
2.7	Yes	2.7	Yes
1.9	Yes	1.9	Yes
2.5	Yes	2.5	Yes
2.5	Yes	2.5	Yes
2.6	Yes	2.6	Yes
3.3	Yes	3.3	Yes
0.5	No	0.5	No
3.2	Yes	3.2	Yes
-5.1	No	-5.7	No
1.7	Yes	-4.5	No

4.9	Yes	4.5	Yes
2.0	Yes	2.8	Yes
1.0	No	1.2	Yes
-1.8	No	-3.2	No
-1.2	No	-1.2	No
-1.1	No	-5.3	No
8.8	Yes	4.2	Yes
-9.6	No	-2.8	No
1.8	No	-4.5	No
-0.4	No	-21.0	No
2.6	No	-7.1	No

Brian Deason
Senior Hydroelectric Compliance Specialist
El Dorado Irrigation District
2890 Mosquito Road
Placerville, CA 95667
PHONE: 530-642-4064
FAX 530-622-6197

-----Original Message-----
From: Jennifer Watts [mailto:JWatts@waterboards.ca.gov]
Sent: Thursday, August 20, 2009 11:44 AM
To: Deason, Brian
Cc: Camilla Williams
Subject: Re: Caples Emergency Repairs Water Quality Report

Brian,
Here are my comments on the Caples Lake Emergency Repairs Water Quality Monitoring Report. I was concerned to see the high turbidity values during the first couple of days of project activities, but I realize that steps were taken to try to reduce the release of high turbidity water. I also reviewed the 401 WQ certification and realized that it included some relaxation of turbidity standards during "in-water working periods", so I am satisfied that the correct actions were taken.

I realize that the report is intended to cover the Forest Service monitoring requirements, however you may also want to add a short discussion of the requirements contained in the certification regarding actions that need to occur if visible plumes are observed. If you had observed visible plumes downstream of the outlet works, you were supposed to begin additional turbidity monitoring. It's not clear to me whether visible plumes were evident during project activities (except in the beginning).

One more comment I have is that I am not sure that averaging the turbidity values between the eastside and dam locations is appropriate, although I guess that during the time that the bypass pumps were still in use, this may be warranted.

If you have any questions, let me know.

Jennifer

Jennifer Watts, Ph.D.
Environmental Scientist
Division of Water Rights
Phone: 916 341-5397
Email: jwatts@waterboards.ca.gov

>>> "Deason, Brian" <bdeason@eid.org> 8/6/2009 4:45 PM >>>
Hello ERC,

Please see attached for the Caples Emergency Repairs Water Quality Monitoring Report. The USFS requested EID conduct water quality monitoring during and after the Caples emergency repair project. This report provides the results of that water quality monitoring effort. Pursuant to FERC's January 14 order approving the Caples Emergency Repairs Water Quality Monitoring Plan, I am requesting FS, SWRCB, and ERC members provide me any comments and recommendations on or before August 20 so that I may file the report with FERC.

Thanks!

Brian

Brian Deason

Senior Hydroelectric Compliance Specialist

El Dorado Irrigation District

2890 Mosquito Road

Placerville, CA 95667

PHONE: 530-642-4064

FAX 530-622-6197