Study 2.3

WATER QUALITY

November 2010

1.0 Project Nexus

Yuba County Water Agency's (YCWA or Licensee) continued operation and maintenance (O&M) of the existing Yuba River Development Project (Project) has a potential to affect water quality. Hydroelectric facilities control the timing and magnitude of flow delivered to stream channels and residence time of water within Project impoundments; these hydrologic factors define the physical, chemical and biological characteristics of water within the Yuba River watershed.

Water temperature is not addressed in this study but in two separate studies: Water Temperature Monitoring and Water Temperature Modeling. Additionally, consistency of water quality with methylmercury fish tissue objectives is addressed in a separate study: Bioaccumulation.

2.0 Resource Management Goals of Agencies and Indian Tribes with Jurisdiction over the Resource Studied

[Relicensing Participants - This section is a placeholder in the Pre-Application Document (PAD). Section 5.11(d)(2) of 18 CFR states that an applicant for a new license must in its proposed study *"Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied."* During 2010 study proposal development meetings, agencies advised License that they would provide a brief written description of their jurisdiction over the resource to be addressed in this study. If provided before Licensee files its Proposed Study Plan and Licensee agrees with the description, Licensee will insert the brief description here stating the description was provided by that agency. If not, prior to issuing the Proposed Study Plan, Licensee will describe to the best of its knowledge and understanding the management goals of agencies that have jurisdiction over the resource addressed in this study. Licensee]

3.0 Study Goals and Objectives

The goals of this study are: 1) to characterize existing water quality conditions in Project reservoirs and Project-affected reaches of the North, Middle and mainstem Yuba rivers and tributaries including Oregon Creek, 2) to determine consistency with state and federal water quality objectives, standards, and criteria, and 3) to identify potential Project O&M related causes for Basin Plan Objectives and Beneficial Use protections to not be met.

The objective of the study is to collect water quality data adequate to meet the study goals.

4.0 Existing Information and Need for Additional Information

Available information consists of existing regulatory plans and advisories for the watershed, as well as water quality data collected to date in the project area.

4.1 Regulatory Status for Surface Water and Fish the Project Area

4.1.1 The Basin Plan

Water Quality Objectives and Beneficial Use Designations for Project reservoirs and Project affected stream reaches are established in Central Valley Regional Water Quality Control Board's (CVRWQCB) *Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin Rivers*, the fourth edition of which was initially adopted in 1998 and most recently revised in 2007 (CVRWQCB 1998). The Yuba River Development Project and the area downstream of the Project falls within two Basin Plan Hydro Units: Hydro Unit 517, which includes New Bullards Bar Reservoir, and Hydro Unit 515.3, which includes the Yuba River from the United States Army Corp of Engineers' (USACE) Englebright Dam to the Feather River. Designated beneficial uses of surface water were excerpted from the Basin Plan and are shown by Hydro Unit in Table 4.1.1-1.

Table 4.1.1-1. Beneficial uses of surface water within the Yuba River Development Project and the area downstream as designated by Hydro Unit (HU) in the Basin Plan (CVRWQCB 1998).

Designated Beneficial Use Description from Basin Plan, Section II		Designated Beneficial Use by Hydro Unit from Basin Plan, Table II-1		
		Use	Sources to USACE's Englebright Reservoir	USACE's Englebright Dam to Feather River
			HU 517	HU 515.3
Municipal and Domestic Supply (MUN)	Uses of water for community, military or individual water supply systems including, but not limited to, drinking water supply.	MUNICIPAL AND DOMESTIC SUPPLY	Existing	---
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.	IRRIGATION	Existing	Existing
		STOCK WATERING	Existing	Existing
Industry	Uses of water for industrial activities that depend primarily on water quality.	INDUSTRIAL PROCESS SUPPLY (PROC)	---	---
	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.	INDUSTRIAL SURVICE SUPPLY (IND)	---	---
	Hydropower generation	POWER (POW)	Existing	Existing
Water Contact Recreation (REC-1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.	CONTACT	Existing	Existing
		CANOEING AND RAFTING*	Existing	Existing

Table 4.1.1-1. (continued)

Designated Beneficial Use Description from Basin Plan, Section II		Designated Beneficial Use by Hydro Unit from Basin Plan, Table II-1		
		Use	Sources to USACE's Englebright Reservoir	USACE's Englebright Dam to Feather River
			HU 517	HU 515.3
Non-Contact Water Recreation (REC-2)	Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach-combing, camping, boating, tide-pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.	OTHER NON-CONTACT	Existing	Existing
Freshwater Habitat	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.	WARM[1,2]	---	Existing
	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.	COLD[1,2]	Existing	Existing
Migration of Aquatic Organisms (MGR)	Uses of water that supports habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.	WARM[2,3]	---	Existing
		COLD[2,4]	---	Existing
Spawning (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.	WARM[2,3]	---	Existing
		COLD[2,4]	Existing	Existing
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats or wetlands, vegetation, wildlife (*e.g.*, mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.	WILDLIFE HABITAT	Existing	Existing

[1] Resident fish; does not include anadromous.
[2] Any hydrologic unit with both WARM and COLD beneficial use designations is considered COLD water bodies for the application of water quality objectives (CVRWQCB 1998).
[3] Striped bass, sturgeon and shad.
[4] Salmon and steelhead.
* Canoeing and rafting are flow-dependent beneficial uses.

4.1.2 California's List of Impaired Waters

Section 303(d) of the Clean Water Act (CWA) requires that every two years each State submit to the United States Environmental Protection Agency (EPA) a list of rivers, lakes and reservoirs in the State for which pollution control or requirements have failed to provide for water quality. The CVRWQCB and State Water Resources Control Board (SWRCB) work together to research and update the list for the Central Valley region of California. Based on a review of this list and its associated Total Maximum Daily Load (TMDL) Priority Schedule, in the Project Vicinity, USACE's Englebright Reservoir has been identified by the SWRCB as CWA §303(d) State Impaired for mercury; and Deer Creek, a tributary to the Yuba River, has been identified as impaired for pH (SWRCB 2006). However, there are currently no approved TMDL plans for the Yuba River.

In 2009, the CVRWQCB recommended including additional surface waters in the Project Area to the 303(d) list as impaired for mercury: New Bullards Bar Reservoir, the Middle Yuba River, the North Fork Yuba River from New Bullards Bar Dam to Englebright Reservoir, the South Yuba River from Lake Spaulding to USACE's Englebright Reservoir, and the Lower Yuba River from USACE's Englebright Reservoir to the Feather (CVRWQCB 2009). The CVRWQCB is also recommending that the lower Yuba River be added to the 303(d) list as impaired for iron (CVRWQCB 2009). These recommendations were considered and adopted by the SWRCB at the August 3, 2010 Board meeting, at which time they were advanced forward for approval by the United States EPA (Azimi-Gaylon, pers. comm., 2010). At the time this study proposal is prepared, they have not bee approved by the EPA.

4.1.3 Fish Ingestion Advisories

Using available fish tissue data and risk-based methodologies, the Office of Environmental Health Hazard Assessment (OEHHA) has issued species-specific fish ingestion advisories for trout, sunfish and bass caught in USACE's Englebright Reservoir (OEHHA 2003, OEHHA 2009). Fish ingestion advisories previously issued for Deer Creek, a tributary to the Yuba River, were recently retracted due to an insufficient quantity of data (OHHEA 2009).

4.2 Existing Water Quality Information

Existing, relevant and reasonably available information found at the Project Area[1] was documented in Section 7.2.9 of the Licensee's Pre-Application Package (YCWA 2010) and is summarized below.

4.2.1 Licensees' Summer 2009 Data

Information regarding water quality in the Project Area was gathered during the low flow summer season in 2009, a period when Project O&M effects were expected to be most pronounced, if they occur. The study consisted of two elements: a general water quality element and a recreation element. The general water quality element consisted of collecting samples from the reservoirs and stream reaches of the Project Area and analyzing each sample for 35 analytes. Secchi disc measurements were also made within reservoirs. The recreation study element consisted of collecting samples adjacent to New Bullards Bar Reservoir's Emerald Cove and Dark Day Campground boat ramps on five separate days over a 30 day period that included the Labor Day weekend. Bacteria counts were made for these samples.

Surface water samples were collected from the 17 locations between September 14 and 17, 2009. Temperatures ranged between 8.8 to 16.1 degrees Centigrade (°C) at all locations except upstream of the Project near the South Yuba River State Park, which had a temperature of 20.9°C. Dissolved oxygen (DO) was generally between 7.3 and 9.5 milligrams per liter (mg/L),

[1] For the purposes of this document, the Project Area is defined as the area within the Federal Energy Regulatory Commission (FERC) existing Project Boundary and the land immediately surrounding the FERC Project Boundary (i.e., within about 0.25 mile of the FERC Project Boundary) and includes Project-affected reaches between facilities and downstream to the next major water controlling feature or structure.

while ph ranged between 7.3 and 8.3 standard units (su) in all 17 samples. Turbidity ranged from non-detect to 15.4 Nephelometric Turbidity Units (NTU) and hardness ranged from 21 to 90 mg/L. The Secchi disc measurement for New Bullards Bar was 9 feet and for USACE's Englebright Reservoir, the Secchi disc depth was 12 feet. Below and within Project facilities, metals and dissolved metals concentrations were either non-detect using laboratory methods or present in trace amounts. Metals concentration in Project surface water met both drinking water standards and aquatic life protective criteria.

Fecal coliform and *Escherichia coli* (*E. coli*) were not found, while total coliform was found. Fecal coliform is the only one of these parameters for which there is a Basin Plan Objective. Since total coliform counts were not accompanied by commensurate *E. coli* counts, it is likely that humans are not responsible for the observed total coliform.

4.2.2 Sacramento River Watershed Program 1996-1998

The Sacramento River Watershed Program collected 27 samples over a 3-year period between 1996 and 1998 from a site near Marysville, directly upstream of the Yuba River's confluence with the Feather River (LWA 2000 *IN* YCWA, CWDR, and BOR 2007). In this program, pH ranged from 7.0-7.8 su, turbidity ranged from 1-153 NTU, DO ranged from 8.0-12 mg/L, Total Organic Carbon (TOC) ranged from 0.7-2.4 mg/L, nitrate-nitrite concentrations ranged from 0.05-0.14 mg/L, and electrical conductivity (EC) ranged from 44-105 microSeimens per centimeter (µS/cm). Samples were also analyzed for mercury (total; 1.19-46.7 nanograms per Liter, or ng/L). Samples collected in the earliest rounds were also analyzed for seven trace metals which were taken off the anlayte list after metal concentrations were found to be consistently below drinking water criteria (LWA 2000).

4.2.3 Oroville Relicensing Water Quality Study 2002-2004

In support of the Oroville Dam relicensing effort, the California Department of Water Resources (CDWR) collected 30 samples from a Feather River site near Marysville, directly upstream of the Yuba River's confluence with the Feather River (DWR 2004 *IN* HDR|SWRI 2007). DWR analyzed each sample for more than 50 analytes, including total and dissolved metals. In the DWR samples, pH ranged from 7.1-7.4 su; turbidity ranged from 0.5-17.2 mg/L; DO ranged from 8.4-14.2 mg/L; TOC ranged from 0.8-3.6 mg/L; nitrate-nitrite concentrations ranged from less than 0.01-0.08 mg/L; and EC ranged from 76-28 µS/cm.

4.2.4 South Yuba River Citizens League (SYRCL) 2000-2009

Since 2000, as weather and access have allowed, the South Yuba River Citizens League (SYRCL), a non-governmental organization, has implemented a citizen's monitoring program, funded by a grant sponsored by the Regional Water Quality Control Board (RWQCB). The program consists of sampling up to 33 sites in the Yuba River watershed for dissolved oxygen, pH, conductivity, temperature, turbidity, total suspended solids, and some metals (arsenic, mercury), sometimes as often as monthly. Based on these data, SYRCL has identified arsenic, bacteria, and mercury as constituents of concern in the watershed (SYRCL 2006; SYRCL Website 2005 *IN* HDR|SWRI 2007).

Upstream of the Project, surface water samples were collected from the North Yuba River just upstream of New Bullards Bar Reservoir during an 8 to 12-month period in 2001 (SYRCL 2007 *IN* HDR|SWRI 2007). A total of seven samples were collected for six general water quality parameters: pH ranged from 7-8.1 su, turbidity ranged from 0-45 mg/L, DO ranged from 8.3-12.3 mg/L, TOC ranged from 0.59-2.6 mg/L, nitrate-nitrite ranged from 0.025-0.05 mg/L, and EC ranged from 20-30 µS/cm. In the Project Area, SYRCL has been sampling downstream of Colgate Powerhouse, measured constituents consisted of pH (6.8-8.6 su), DO (9.5-14.5 mg/L), temperature (7.1-18.4 C), turbidity (0-16.6 NTU), and electrical conductivity (60-143 µS/cm).

Between 2001 and 2009, SYRCL collected samples from three locations downstream of USACE's Englebright Reservoir to the Feather River confluence, Parks Bar at Highway 20, Hallwood Avenue, and Marysville above the confluence with the Feather River (SYRCL 2009). Samples were analyzed at different frequencies and results were as follows: coliform ranged from 42 to greater than 2,410 MPN/100 ml; arsenic ranged from non-detect in laboratory analysis to 3.9 mg/L; iron ranged from non-detect to 2360 mg/L; copper ranged from 1.06-19 mg/L; zinc ranged from 0.4-13.6 mg/L; chromium ranged from non-detect to 0.94 mg/L; and turbidity ranged from non-detect to 27 mg/L.

4.2.5 Need for Additional Data

Historic data suggest that surface water of the Project Area generally meets Basin Plan Objectives. However, the vast majority of historic data is 10 years old or more, much of it has been collected near the mouth of the Yuba River, and Licensee's 2009 data was collected only in one season – summer low flow period. Data collection efforts throughout project affected streams and impoundments during the spring runoff would be useful, as would water quality information from additional sites during the summer low flow period and downstream of New Bullards Bar reservoir in the fall.

5.0 Study Methods and Analysis

5.1 Study Area

For the purpose of this study, the study area includes 1) the Middle Yuba River from and including Our House Diversion Dam Impoundment to the confluence with the North Yuba River, 2) Oregon Creek from and including the Log Cabin Diversion Dam Impoundment to the confluence with the Middle Yuba River, 3) the North Yuba River from and including New Bullards Bar Dam Reservoir to the confluence with the Middle Yuba River, and 4) and the portion of the Yuba River from the confluence of the North and Middle Yuba rivers to the Feather River, including USACE's Englebright Reservoir. Background conditions will be collected from sites upstream of all Project facilities.

If YCWA proposes an addition to the Project, the study area will be expanded if necessary to include areas potentially affected by the addition.

5.2 General Concepts and Procedures

The following general concepts and practices apply to the study:

- Personal safety is the most important consideration of each fieldwork team.
- Licensee will make a good faith effort to obtain permission to access private property where needed well in advance of entering the property.
- Field crews may make minor variances to the FERC-approved study in the field to accommodate actual field conditions and unforeseen problems. When minor variances are made, Licensee's field crew will follow the protocols in the FERC-approved study.
- When Licensee becomes aware of major variances to the FERC-approved study, Licensee will issue an e-mail to the Relicensing Contact List describing the variance and reason for the variance. Licensee will contact by phone the Forest Service (if the variance is on National Forest System land), USFWS, SWRCB and CDFG to provide an opportunity for input regarding how to address the variance. Licensee will issue an e-mail to the Relicensing Contact List advising them of the resolution of the variance. Licensee will summarize in the final study report all variances and resolutions.
- Licensee's performance of the study does not presume that Licensee is responsible in whole or in part for measures that may arise from the study.
- Global Positioning System (GPS) data will be collected using either a Map Grade Trimble GPS (sub-meter data collection accuracy under ideal conditions), a Recreation Grade Garmin GPS unit (3 meter data collection accuracy under ideal conditions), or similar units. GPS data will be post-processed and exported from the GPS unit into Geographic Information System (GIS) compatible file format in an appropriate coordinate system using desktop software. The resulting GIS file will then be reviewed by both field staff and Licensee's relicensing GIS analyst. Metadata will be developed for deliverable GIS data sets.
- Licensee's field crews will record incidental observations of aquatic and wildlife species observed during the performance of this study. All incidental observations will be reported in the appropriate Licensee report (e.g., incidental observations of special-status fish recorded during fieldwork for the Special-Status Turtles – Western Pond Turtle Study will be reported in Licensee's Stream Fish Populations Study report). The purpose of this effort is not to conduct a focus study (i.e., no effort in addition the specific field tasks identified for the specific study) or to make all field crews experts in identifying all species, but only to opportunistically gather data during the performance of the study.
- Field crews will be trained on and provided with materials (e.g., Quat) for decontaminating their boots, waders, and other equipment between study sites. Major concerns are amphibian chytrid fungus, and invasive invertebrates (e.g., zebra mussel, *Dreissena polymorpha*). This is of primary importance when moving: 1) between tributaries and mainstem reaches; 2) between basins (e.g., Middle Yuba River, Yuba River, and North Yuba River); and 3) between isolated wetlands or ponds and river or stream environments.

5.3 Methods

The study will be performed in eight steps: 1) select water quality parameters; 2) select sampling locations; 3) collect water samples; 4) perform laboratory analyses using standard methods adequately sensitive to determine consistency with state and federal water quality standards; 5) prepare quality assurance/quality control (QA/QC) review; 6) determine consistency with Basin Plan Objectives and beneficial use protection needs; 7) consult Operations Staff; and 8) prepare report. The report will be made available to Relicensing Participants. Each of these steps is described below.

5.3.1 Step 1 - Select Water Quality Parameters

For the purpose of this study proposal, water quality parameters to be measured are divided into two categories: 1) general water quality and 2) recreation. The parameters included in each category and associated information are listed in Table 5.3.1-1.

Table 5.3.1-1. Water quality parameters to be measured and methods, reporting limits and laboratory holding times for each.

	Analyte		Method	Target Reporting Limit µg/L (or other)	Hold Time
GENERAL STUDY	**BASIC WATER QUALITY- IN SITU**				
	Dissolved Oxygen	DO	SM 4500-O	0.1 mg/L	Field
	Specific conductance	---	SM 2510A	0.001 µmhos	Field
	pH	---	SM 4500-H	0.1 su	Field
	Turbidity	---	SM 2130 B	0.1 NTU	Field
	Secchi Disc	---	---	---	Field
	BASIC WATER QUALITY—LABORATORY				
	Total Organic Carbon	TOC	SM 5310	0.2 mg/L	28 d
	Dissolved Organic Carbon	DOC	EPA 415.1 D	0.5/0.1	28 d
	Total Dissolved Solids	TDS	EPA 2540 C SM 2340 C	1 mg/L	7d
	Total Suspended Solids	TSS	EPA 2520 D SM 2340 D	1 mg/L	7d
	INORGANIC IONS				
	Total Alkalinity	---	SM 2340 B	2000	14 d
	Calcium	Ca	EPA 6010 B	30	180 d
	Chloride	Cl	EPA 300.0	20	28 d
	Hardness (measured value)	---	EPA 2340 B SM 2340 C	1 mg/L as $CaCO_3$	14 d
	Magnesium	Mg	EPA 6010 B	1	180 d
	Potassium	K	EPA 6010 B	500	180 d
	Sodium	Na	EPA 6010 B	29	180 d
	Sulfate	SO_4^{2-}	EPA 300.0	1.0 mg/L	28 d
	Sulfide	S^{2-}	SM 4500 S2 - D	0.05 mg/L	28 d
	NUTRIENTS				
	Nitrate-Nitrite	---	EPA 300.0	2	28 d <pH 2
	Total Ammonia as N	---	EPA 4500-NH3 SM 4500-NH3	0.02	28 d <pH 2
	Total Kjeldahl Nitrogen as N	TKN	SM 4500 N	100	28 d <pH 2
	Total phosphorus	TP	SM4500 P	20	28 d <pH 2
	Dissolved Orthophosphate	PO_4	EPA 365.1 EPA 300.0	0.01	48 h at 4 °C
	METALS (total and dissolved)				
	Aluminum (total and dissolved)	Al	EPA 200.8/EPA 1638	4.0/ 0.4	180 d
	Arsenic (total and dissolved)	As	EPA 200.8/1638	0.15/0.04	180 d

Table 5.3.1-1. (continued)

	Analyte		Method	Target Reporting Limit µg/L (or other)	Hold Time
GENERAL STUDY (continued)	Cadmium (total and dissolved)	Cd	EPA 200.8/1638	0.020/0.004	180 d
	Chromium, Total (total and dissolved)	Cr	EPA 200.8/1638	0.010/0.03	180 d
	Copper (total and dissolved)	Cu	EPA 200.8/1638	0.10/0.01	180 d
	Iron (total and dissolved)	Fe	EPA 200.8/1638	10.0/3.2	180 d
	Lead (total and dissolved)	Pb	EPA 200.8/EPA 1638	0.040/0.003	180 d
	Mercury (total)	Hg	EPA 1631	0.0005/0.00008	28 d
	Methylmercury (total and dissolved)	CH_3Hg	EPA 1630	0.00005/0.000019	90 d
	Nickel (total and dissolved)	Ni	EPA 200.8/1638	0.10/0.01	180 d
	Selenium (total)	Se	EPA 200.8/1638	0.60/0.19	180 d
	Silver (total and dissolved)	Ag	EPA 200.8/1638	0.20/0.006	180 d
	Zinc (total and dissolved)	Zn	EPA 200.8/1638	0.2/0.1	180 d
RECREATION? STUDY	**BACTERIA**				
	Total coliform	---	SM 9221	1.1 MPN	24 h
	Fecal coliform	---	SM 9221	1.1 MPN	24 h
	Escherichia coli	*E. coli*	SM 9223	1.1 MPN	24 h
	PETROLEUM HYDROCARBONS				
	Total Petroleum Hydrocarbons (gasoline range)	TPH-g	SW 8015B	50	14 d
	Oil & Grease	O&G	Visual Observation	---	---

Key:
EPA = United States Environmental Protection Agency
$CaCO_3$ = Calcium carbonate
d = days
h = hours
µmhos = micro-ohms
µg/L = micrograms per liter (equals parts per billion)
mg/L = milligrams per liter (equals parts per million)
MPN = Most Probable Number
NTU = Nephelometric Turbidity Units
SM = Standard Method
su = Standard Unit

5.3.2 Step 2 – Select Sampling Locations

5.3.2.1 Select General Water Quality Sample Locations

General water quality samples will be collected upstream and downstream of the Project reservoir, diversions and powerhouses. Samples will also be collected downstream of Project facilities at multiple sites between USACE's Englebright Reservoir and the Feather River. In New Bullards Bar Reservoir and in the USACE's Englebright Reservoir samples will be collected at a minimum of three sites each, including the deepest part of the reservoir near the dams. At each reservoir location, general water chemistry samples will be collected for laboratory analysis at two depths: within the hypolimnion and just below the surface in the epilimnion (Table 5.3.2-1).

Table 5.3.2-1. General water quality sample Locations - reservoirs.

Reservoir	Sample Depth	Location
NORTH YUBA RIVER		
New Bullards Bar Reservoir	Surface	Three Sites: 1) Near Madrone Cove, 2) Mid-Reservoir at influence of Slate Creek, and 3) Near Dam
	Bottom	

Table 5.3.2-1. (continued)

Reservoir	Sample Depth	Location
YUBA RIVER		
USACE's Englebright Reservoir	Surface	Three Sites: 1) Upper reservoir, 2) Mid-Reservoir, and 3) Near Dam
	Bottom	

Stream samples for general water quality will be collected upstream and downstream of New Bullards Bar Reservoir and USACE's Englebright Reservoir, and at four locations between USACE's Englebright Dam and the Feather River (Table 5.3.2-2). Water chemistry samples will be grab samples collected for laboratory analysis from the moving water.

Table 5.3.2-2. General water quality sample locations - stream reaches.

Stream Reach	Sample Depth	Location	Notes
MIDDLE YUBA RIVER			
--	Surface	Above Our House Dam Diversion	Above New Bullards Bar Inflow SYRCL Sampling Site
Our House Diversion Dam Reach	Surface	Below Our House Dam Diversion	Immediately downstream of dam
	Surface	MYR upstream of confluence with NYR	MYR and Oregon Creek conditions
OREGON CREEK			
--	Surface	Above Log Cabin Diversion Dam	Immediately upstream of the impoundment and above inflow from tunnel
Log Cabin Diversion Dam Reach	Surface	Below Log Cabin Diversion Dam	Immediately downstream of dam
NORTH YUBA RIVER			
--	Surface	Below Fiddle Creek at Hwy 49[1]	SYRCL Sampling Site
New Bullards Bar Dam Reach	Surface	Below New Bullards Bar Dam	---
YUBA RIVER			
--	Surface	Above Colgate Powerhouse	SYRCL Sampling Site
Colgate Powerhouse Reach	Surface	Below Colgate Powerhouse	---
	Surface	Downstream of Dobbins Ck/ upstream of SYR confluence & high-water line of Englebright Reservoir	Mixing of Dobbins with New Bullards/Colgate flow in Yuba
SOUTH YUBA RIVER			
--	Surface	South Yuba River State Park – SYR upstream of Englebright high-water line	SYR delivery conditions from Yuba-Bear and Drum-Spaulding Projects; and routing; SYRCL's Bridgeport sampling site
YUBA RIVER			
--	Surface	Narrows #2 Tailrace/ Below USACE's Englebright Dam	---
Narrows 2 Powerhouse Reach	Surface	Below Deer Creek at Hwy 20	SYRCL Sampling Site
Daguerre Point Dam Reach	Surface	Below USACE's Daguerre Point Diversion Dam	SYRCL Sampling Site
	Surface	At Walnut Avenue	---
	Surface	Marysville	SYRCL Sampling Site

[1] Or, if water levels are low, a location in flowing water upstream of the reservoir
[2] A location near the head of the reservoir.

Key:
Hwy = Highway
MYR = Middle Yuba River
SYR= South Yuba River
SYRCL= South Yuba River Citizens League
USACE= United States Army Corps of Engineers

5.3.2.2 Select Reservoir Recreation Water Quality Sample Locations

Two recreation water quality samples will be collected, one each from the surface of New Bullards Bar Reservoir near the boat ramps in Emerald Cove a Dark Day Campground (Table 5.3.2-3).

Table 5.3.2-3. Recreation water quality sample locations--reservoir.

Reservoir	Sample Depth	Location
NORTH YUBA RIVER		
New Bullards Bar Reservoir	Surface	Emerald Cove Near the Boat Ramp
	Surface	Dark Day Cove Near the Boat Ramp

If Licensee identifies additional locations of concern regarding Project-related bacteria in New Bullards Bar Reservoir during the Recreation Use and Visitor Surveys Study, additional recreation-related bacteria sampling will be performed at those locations.

5.3.3 Step 3 – Collect Samples

All data will be acquired in accordance with standard quality assurance practices.

5.3.3.1 General Water Quality Reservoir and Stream Sampling

Water chemistry samples will be collected from all locations in the spring run-off period (June/July) and late summer low flow season (late August/early September). A single sample will be collected downstream of New Bullards Bar for a third time, in the fall (October).

5.3.3.1.1 In Situ Sampling

In situ water quality measurements will be made at these same depths with a Hydrolab DataSonde 5 (Hydrolab), or other instrument with similar precision and accuracy. Water temperature (±0.1°C), DO (±0.2 mg/L), pH (±0.2 standard unit, or su), specific conductance (±0.001 micromhos per centimeter (µomhos/cm)), and turbidity (± 1 NTU) will be measured *in situ* using a Hydrolab DataSonde 5 or other similar instrument that has the same precision and accuracy. Prior to and after each use, the instrument will be calibrated using manufacturer's recommended calibration methods. Any variances will be noted on the field data sheet and final report and recalibration or repair done as necessary. Licensee will note relevant conditions during each sampling event on the field data sheet (*i.e.,* air temperature, flow, description of location, floating material, evidence of oil and grease, and activities in the vicinity of sampling site that could cause short or long term alterations to water quality, such as dredging).

5.3.3.1.2 Laboratory Samples

Each laboratory sample will be collected into laboratory-supplied clean containers. Water samples to be analyzed for metals will be taken using "clean hands" methods consistent with the EPA's Method 1669 sampling protocol *Sampling Ambient Water for Trace Metals at EPA Water*

Quality Criteria (EPA 1995). Samples requiring filtration before metals analysis will be filtered in accordance with standard protocols in the field. Certification of filter cleanliness will be obtained from the vendor and kept in the Project files.

All sample containers will be labeled with the date and time that the sample is collected, sampling site or identification label and handled in a manner consistent with appropriate chain-of-custody protocols. The sample container will be preserved (as appropriate), stored and delivered to a State of California-certified water quality laboratory for analyses of the parameters listed in Table 5.3.1-1 in accordance with maximum holding periods for each parameter. A chain-of-custody record will be maintained with the samples at all times. The sampling site location will be recorded using a GPS unit.

As part of the field quality assurance program, two field blanks and equipment rinsates will be collected and submitted to the laboratory (approximately one for every ten analyses). A field blank is a sample of analyte-free water poured into the container in the field, preserved and shipped to the laboratory with samples. A field blank for filtered samples will be similarly created, but filtered using field techniques before pouring into the container. A field blank assesses the contamination from field conditions during sampling. A rinsate is a sample of analyte-free water poured over or through decontaminated field sampling equipment prior to the collection of samples. It assesses the adequacy of the decontamination processes. Two duplicate samples will also be collected.

5.3.3.1.3 Secchi Depth Readings in Reservoirs

Prior to collecting reservoir samples, a Secchi disk will be slowly lowered into the water on the shady side of the boat until it is no longer visible, and the depth recorded. Then, the Secchi disc will be slowly raised until it just becomes visible once again and this depth will be recorded a second time. The average the two depths will be considered the Secchi depth.

5.3.3.2 Recreation Water Quality Sampling

In accordance with bacteria sampling protocols, bacteria samples will be collected on five different days within a 30-day period which spans either the Independence Day or Labor Day holiday weekends (CVRWQCB 1998). A single petroleum hydrocarbon sample will be collected at each location during the holiday weekend included in the bacteria sampling. At each near-shore sample location, surface water will be collected from the near surface (bacteria) and/or the surface (petroleum hydrocarbons). Visual observations of oil and grease will be recorded in the field notebook.

5.3.4 Step 4 – Perform Laboratory Analyses

5.3.4.1 Chemical Analyses

All laboratory analyses will be conducted using EPA Standard Methods or the equivalent sufficiently sensitive to detect and report at levels necessary for evaluation against state and federal water quality standards. A State of California-certified laboratory will prepare and analyze water samples for the following surface water analytical parameters:

- Basic Water Chemistry - Laboratory
- Inorganic Ions
- Metals
- Nutrients
- Petroleum Hydrocarbons

The analytes and target reporting limits associated with each parameter are listed in Table 5.3.1-1.

5.3.4.2 Bacteria Analyses

Surface water samples collected adjacent to recreation sites will be analyzed for:

- Total coliform
- Fecal coliform
- Escherichia coli

Bacteria samples will be delivered to a local laboratory within the holding times required in Table 5.3.1-1.

5.3.5 Step 5 – Prepare Quality Assurance/Quality Control Review

All data will be verified and/or validated as appropriate. In brief, following the field sampling and laboratory analyses, which includes the laboratories' own QA/QC analysis, Licensee will subject all data to QA/QC procedures including, but not limited to: spot-checks of transcription; review of electronic data submissions for completeness; comparison of results to field blank and rinsate results; and, identification of any data that seem inconsistent. If such a datum is found, Licensee will consult with the laboratory to identify any potential sources of error before concluding that the datum is correct.

All verified chemical detections, including data whose results are "J" qualified,[2] will be used for this assessment. Should the laboratory need to re-extract samples and re-run the sample under

[2] Results with a "J" qualifier are results where the chemical was detected, but there is uncertainty in the quantity. The quantity is above the method detection limit, but below the reporting limit.

different calibration conditions, the data identified by the laboratory, as the most certain, will be used. If field-sampling conditions, as measured by the field blank and the rinsate sample results, indicate that samples have been corrupted, Licensee will identify the data accordingly.

5.3.6 Step 6 – Determine Consistentency with Basin Plan Objectives

Table 5.3.6-1 shows the standards, criteria and benchmark values that will be used to assist with in the assessment of sample results and their consistency with the Basin Plan Objectives. The selected values primarily consist of the Title 22 drinking water standards, which are incorporated by reference into the Basin Plan itself, and the California Toxics Rule (CTR) (EPA 2000). However, when a study analyte does not have a compliance threshold (benchmark) in one these preferred sources, benchmarks will be applied from *A Compilation of Water Quality Goals* (Marshack 2008, as amended for July 2008 – April 2010); *Water Quality Standards for Recreational Waters* (EPA 2003; another compilation with multiple regional sources); and others as cited.

Table 5.3.6-1. Standards, Criteria and Benchmarks used for determining consistency with Basin Plan Objectives and designated beneficial uses of water in project reservoirs and project-affected stream reaches.[1]

Analyte	Symbol or Abbreviation	Standard, Criteria or Benchmark Value	Reference	Notes
BACTERIA (MUN, REC-1)				
Total coliform	---	< 10,000 MPN per 100 mL < 240 MPN per 100 mL (geometric mean);	EPA 2003	Water contact recreation, single-day sample; Water contact recreation, 30-day geometric mean
Fecal coliform	---	< 200 MPN per 100 mL (geometric mean); < 10% of samples > 400 MPN per 100 mL	CVRWQCB 1998	Water contact recreation, 30-day geometric mean; with individual samples not > 400 MPN/100 mL
Escherichia coli	*E. coli*	< 126 MPN per 100 mL (geometric mean) < 235 MPN per 100 mL in any single sample	CVRWQCB 2002; EPA 2003	Water contact recreation, 30-day geometric mean
BIOSTIMULATORY SUBSTANCES (COLD, SPAWN)				
Total Kjeldahl Nitrogen	TKN	None	---	---
Total Phosphorous	TP	None	---	---
CHEMICAL CONSTITUENTS (MUN)				
Alkalinity	---	20 mg/L	Marshack 2008	EPA AWQC; less than 20 mg/L can affect water treatment
Aluminum	Al	1 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Arsenic	As	0.01 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Cadmium	Cd	5 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Calcium	Ca	None	---	---
Analyte	Symbol or Abbreviation	Standard, Criteria or Benchmark Value	Reference	Notes

Table 5.3.6-1. (continued)

CHEMICAL CONSTITUENTS (MUN) (continued)				
Chromium (total)	Cr (total)	50 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Copper	Cu	1.3 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Lead	Pb	15 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Mercury (inorganicl)	Hg	2 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Nickel	Ni	100 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Nitrate	NO_3-N	45 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Nitrite	NO_2-N	1 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Nitrate + Nitrite	NO_3-N+NO_2-N	10 mg/L (combined total)	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Potassium	K	None	---	---
Selenium	Se	50 µg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64431 Primary MCL
Sodium	Na	20 mg/L	Marshack 2008	Sodium Restricted Diet[2]
DISSOLVED OXYGEN (COLD, SPAWN)				
Dissolved Oxygen	DO	> 7 mg/L (minimum)	CVRWQCB 1998	Aquatic life protection
FLOATING MATERIAL (REC-1, REC-2)				
Floating Material	---	Narrative Criteria	CVRWQCB 1998	Aesthetics – Absent by visual observation
OIL & GREASE (REC-1, REC-2)				
Oil & Grease	---	Narrative	CVRWQCB 1998	Aesthetics – Absent by visual observation
Total Petroleum Hydrocarbons	TPH	None	---	---
pH (MUN, COLD, SPAWN, WILD)				
pH	---	6.5-8.5	CVRWQCB 1998	Aquatic life protection
SEDIMENT AND SETTLEABLE SOLIDS (REC-2, SPAWN, WILD)				
Sediment	---	Narrative	CVRWQCB 1998	See Geology and Soil Resources
TASTES & ODOR (MUN)				
Aluminum	Al	0.2 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Chloride	Cl	250 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Copper	Cu	1.0 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Iron	Fe	0.3 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Silver	Ag	0.1 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Specific conductance	---	900 µS/cm	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Sulfate	SO_4^{2-}	250 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL

Table 5.3.6-1. (continued)

Analyte	Symbol or Abbreviation	Standard, Criteria or Benchmark Value	Reference	Notes
TASTES & ODOR (MUN) (continued)				
Total Dissolved Solids	TDS	500 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
Zinc	Zn	5 mg/L	CDPH 2010 cited in CVRWQCB 1998	22 CCR §64449 Secondary MCL
TEMPERATURE (COLD, SPAWN)				
Temperature	---	Narrative	CVRWQCB 1998	See Water Temperature Study
TOXICITY (COLD, SPAWN, MUN)				
Alkalinity	---	20 mg/L	Marshack 2008	EPA AWQC; buffering capacity
Aluminum	Al	0.087 µg/L	Marshack 2008	EPA AWQC; aquatic life protective[3]
Ammonia as N (pH and Temp dependent)	NH_3-N	24.1 mg/L (CMC); 4.1-5.9 mg/L (CCC)	EPA 2000	CTR criteria over 0-20°C assuming pH 7.0
		5.6 mg/L (CMC); 1.7-2.4 mg/L (CCC)	EPA 2000	CTR criteria over 0-20°C assuming pH 8.0
		0.9 mg/L (CMC); 0.3-0.5 mg/L (CCC)	EPA 2000	CTR criteria over 0-20°C assuming pH 9.0
Arsenic	As	0.34 mg/L (CMC); 0.15 mg/L (CCC)	EPA 2000	CTR criteria
Cadmium (hardness dependent)	Cd	0.16 µg/L (CMC); 0.25 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		0.35 µg/L (CMC); 0.41 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		0.54 µg/L (CMC); 0.56 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		0.95 µg/L (CMC); 0.81 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Chloride	Cl-	860 mg/L (CMC); 230 mg/L (CCC)	Marshack 2008	EPA AWQC; aquatic life protective
Chromium (hardness dependent)	Cr	47.19 µg/L (CMC); 15.31 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		83.25 µg/L (CMC); 27.0 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		116.03 µg/L (CMC); 37.64 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		176.31 µg/L (CMC); 57.19 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Copper (hardness dependent)	Cu	0.8 µg/L (CMC); 0.69 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		1.54 µg/L (CMC); 1.25 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		2.25 µg/L (CMC); 1.77 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		3.64 µg/L (CMC); 2.74 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Iron	Fe	1 mg/L (CCC)	Marshack 2008	EPA AWQC; aquatic life protective

Table 5.3.6-1. (continued)

Analyte	Symbol or Abbreviation	Standard, Criteria or Benchmark Value	Reference	Notes
TOXICITY (COLD, SPAWN, MUN) (continued)				
Mercury (total)	Hg	0.050 µg/L	EPA 2000 40 CFR 131.38	CTR/Federal Register. 5/18/00
Nickel (hardness dependent)	Ni	37.2 µg/L (CMC); 4.1 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
Nickel (continued) (hardness dependent)	Ni (continued)	66.9 µg/L (CMC); 7.4 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		94.3 µg/L (CMC); 10.5 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		145.2 µg/L (CMC); 16.1 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Selenium (total)	Se	20 µg/L (CMC) 5 µg/L (CCC)	Marshack 2008	EPA AWQC; aquatic life protective
Silver (hardness dependent)	Ag	0.02 µg/L (CMC) Instantaneous	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		0.07 µg/L (CMC) instantaneous	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		0.13 µg/L (CMC) instantaneous	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		0.32 µg/L (CMC) instantaneous	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Lead (hardness dependent)	Pb	2 µg/L (CMC) 0.086 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		5 µg/L (CMC) 0.191 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		8 µg/L (CMC) 0.303 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		14 µg/L (CMC) 0.54 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$
Specific conductance	---	150 µmhos	CVRWQCB 1998	Aquatic Life Protection
Zinc (hardness dependent)	Zn	9.26 µg/L (CMC) 9.33 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 5 mg/L as $CaCO_3$
		16.66 µg/L (CMC) 16.79 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 10 mg/L as $CaCO_3$
		23.48 µg/L (CMC) 23.68 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 15 mg/L as $CaCO_3$
		36.20 µg/L (CMC) 36.50 µg/L (CCC)	EPA 2000	CTR for dissolved sample assuming hardness of 25 mg/L as $CaCO_3$

Table 5.3.6-1. (continued)

Analyte	Symbol or Abbreviation	Standard, Criteria or Benchmark Value	Reference	Notes
TURBIDITY (COLD, SPAWN, WILD, MUN)				
Turbidity	NTU	increase < 1 NTU for 1-5 NTU background; increase < 20% for 5-50 NTU background; increase < 10 NTU for 50-100 NTU background	CVRWQCB 1998	Aesthetics, disinfection

[1] Note: a constituent may be listed under more than one beneficial use. When a standard or criterion was not available, benchmarks were excerpted from EPA (2003) and Marshack (2008).
[2] Guidance level to protect those individuals restricted to a total sodium intake of 500 mg/day (Marshack 2008).
[3] Benchmark is likely overly protective, as EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 0.087 µg aluminum/L, when either total recoverable or dissolved is measured (Marshack 2008)

Key:

AWQC = Ambient Water Quality Criteria
EPA = Environmental Protection Agency
$CaCO_3$ = Calcium carbonate
CMC = Criterion Maximum Concentration (1-hour acute exposure) for aquatic toxicity as defined by EPA (2000)
CCC = Criterion Continuous Concentration (4-day chronic exposure) for aquatic toxicity as defined by EPA (2000)
CTR = California Toxics Rule
MCL = Maximum Contaminant Level
µmhos = micromhos
µg/L = micrograms per liter
mg/L = milligrams per liter
MPN = Most Probable Number
NTU = Nephelometric turbidity units
SM = Standard Method
su = standard unit

The CVRWQCB has adopted, by reference, California Title 22 maximum contaminant levels (MCL) for drinking water as Basin Plan objectives (CVRWQCB 1998), with the exception that more stringent criteria may apply as necessary for protection of specific beneficial uses. Hence, these values are adopted as the drinking water standard herein. It should be noted, however, that chemical concentrations that were originally intended to apply to finished tap water, rather than to untreated sources of drinking water, will be applied to the untreated reservoir or river water.

For water quality objectives related to aquatic toxicity for ammonia and trace metals, the CTR (EPA 2000) is the preferred benchmark source. Part 40 CFR § 131.38 established Criterion Maximum Concentrations (CMC) as the highest concentrations to which aquatic life can be exposed for a short period[3] [one hour] without deleterious effects and Criterion Continuous Concentrations (CCC) as the highest concentration to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. When single grab samples are collected, as will be the case for this study, it is assumed that constituent concentrations are representative of the continuous ambient condition, and CCC values are therefore used as the appropriate criteria to compare against environmental sample results.

Because of differences in acute and chronic toxicity to aquatic organisms of many elements and compounds, as well as variations with ambient water quality such as pH or hardness, several entries in Table 5.3.6-1have multiple benchmarks to illustrate this range. The benchmarks for seven of the metals addressed in this study plan (cadmium, chromium, copper, lead, nickel, silver, and zinc) are reported for dissolved metals from the CTR (EPA 2000). In Table 5.3.6-1, benchmarks for these metals are calculated in 5 mg/L increments of hardness since the aquatic toxicity of these metals reportedly increases as hardness decreases. Similarly, the CMC and

[3] Based on extended sample collection and one-hour averaging.

CCC levels for ammonia are a function of both pH and temperature and are presented for the temperature range of 0º-20ºC in pH increments of 1.0 su in Table 5.3.6-1.

5.3.7 Step 7 – Consult with Operations Staff

If a water quality result suggests Basin Plan objectives are not being met, Licensee will consult with Project Operations staff to identify Project O&M activities that typically occur in the area with the potential to adversely-affect the parameter.

5.3.8 Collaboratively Agree on New Focused Second Year Study

Licensee will meet with interested and available Relicensing Participants no later than 6 weeks prior to the date that Licensee's Initial Study Report is scheduled to be filed with FERC, to review data available from the study at that time and discuss the need for, and scope of, a focused water quality study in 2013. The criteria to be used by Licensee and Relicensing Participants to consider the need for a focused second year study will be when a constituent is found at an elevated level, where elevated is defined as a level outside the standards, criteria and benchmarks provided in Table 5.3.6-1, and the elevated level can reasonably be attributed to Project effects. If Licensee and Relicensing Participants collaboratively agree focused studies are needed in a second year, Licensee will develop a new study proposal and Licensee will file it with FERC prior to or at the same time Licensee files its Initial Study Report, and implement the study as directed by FERC. If Licensee and Relicensing Participants cannot reach consensus on the second year of study proposal, the SWRCB will determine the scope of the focused second-year sampling, and Licensee to file a new study proposal with FERC prior to or at the same time Licensee files its Initial Study Report.

5.3.9 Step 9 – Prepare Report

At the conclusion of the study, YCWA will prepare a report that includes the following sections: 1) Study Goals and Objectives; 2) Methods; 3) Results; 4) Discussion; and 5) Description of Variances from the FERC-approved study proposal, if any. The report will include in Microsoft Excel format on compact disc (CD) a complete water quality dataset. Also, the report will include a table that will show for each parameter measured the results of the sampling sorted by sampling location. Data that that are greater than the benchmarks provided in Table 5.3.6-1 will be highlighted. The table will be appended to report and available in its Microsoft Excel format.

6.0 Study-Specific Consultation

This study requires one study-specific consultation:

- Licensee will collaborate with Relicensing Participants regarding need for a focused second year study as discussed in Step 8.

7.0 Schedule

Licensee anticipates the schedule to complete the study as follows assuming the Preliminary Application Document (PAD) is filed on November 1, 2010 and FERC issues its Study Determination by October 4, 2011:

Select Parameters and Sampling Locations (Steps 1 & 2).....October 2011
Collect Data (Step 3)..... May – November 2011
Lab Analysis and QA/QC Review (Steps 4 & 5) ..... July – December 2011
Basin Plan Consistency and Operations Staff Consultation (Steps 6 & 7)..... December 2011
Collaborative Review of Data and Need for Focused Study (Step 8)…….[See Section 5.3.8]
Prepare Report (Step 9)..... January - March 2012

8.0 Consistency of Methodology with Generally Accepted Scientific Practices

The study methods discussed above are consistent with the study methods followed in several other relicensings. The methods presented in this study plan also are consistent with those used in recent relicensings in California.

9.0 Level of Effort and Cost

[Relicensing Participants – Licensee will include a cost range estimate for this study in its Proposed Study Plan. Licensee]

10.0 References Cited

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