

**Bishop Creek Progress Report 2:**  
**APPENDIX G - BISHOP CREEK WATER QUALITY IMPLEMENTATION PLAN**

# **DRAFT BISHOP CREEK WATER QUALITY STUDY IMPLEMENTATION PLAN**

**BISHOP CREEK HYDROELECTRIC PROJECT  
(FERC PROJECT NO. 1394)**

*Prepared for:*



**Bishop, California**

*Prepared by:*

**Kleinschmidt**

Portland, Oregon  
[www.KleinschmidtGroup.com](http://www.KleinschmidtGroup.com)

April 2020

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**SOUTHERN CALIFORNIA EDISON**

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**REVISED DRAFT BISHOP CREEK WATER QUALITY TECHNICAL  
STUDY PLAN**

**BISHOP CREEK HYDROELECTRIC PROJECT  
(FERC No. 1394)**

**SOUTHERN CALIFORNIA EDISON**

**1.0 INTRODUCTION**

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Southern California Edison Company (SCE) is the licensee, owner and operator of the Bishop Creek Hydroelectric Project (Project) (Federal Energy Regulatory Commission [FERC] Project No. 1394). The Project is located on Bishop Creek in Inyo County, California, approximately 5 miles southwest of the city of Bishop (Figure 1-1). The licensee operates the Project under a 30-year license issued by FERC on July 19, 1994. As the current license is due to expire on June 30, 2024, SCE has initiated the formal relicensing process utilizing the Integrated Licensing Process (ILP) by filing the Notification of Intent (NOI) and Pre-Application Document (PAD) with FERC on May 1, 2019.

In advance of filing the NOI and PAD, SCE worked with stakeholders to identify necessary studies, with the goal of accelerating FERC's ability to issue a Study Plan Determination. Informal efforts began in 2018 with a series of Technical Working Group (TWG) meetings held in Bishop, California prior to the formal initiation of the process with FERC.

During the TWG meetings, and in written comments, stakeholders identified the need to develop an understanding of water quality parameters in the Project area. Draft study plans were distributed with PAD and revised after receiving comments pursuant to 18 CFR § 5.9. FERC approved the Revised Study Plan (RSP) with its Study Plan Determination on November 4, 2019. This Water Quality Study Implementation Plan was subsequently developed to inform the stakeholders of the detailed methods and procedures that will be used as part of the Water Quality Study.



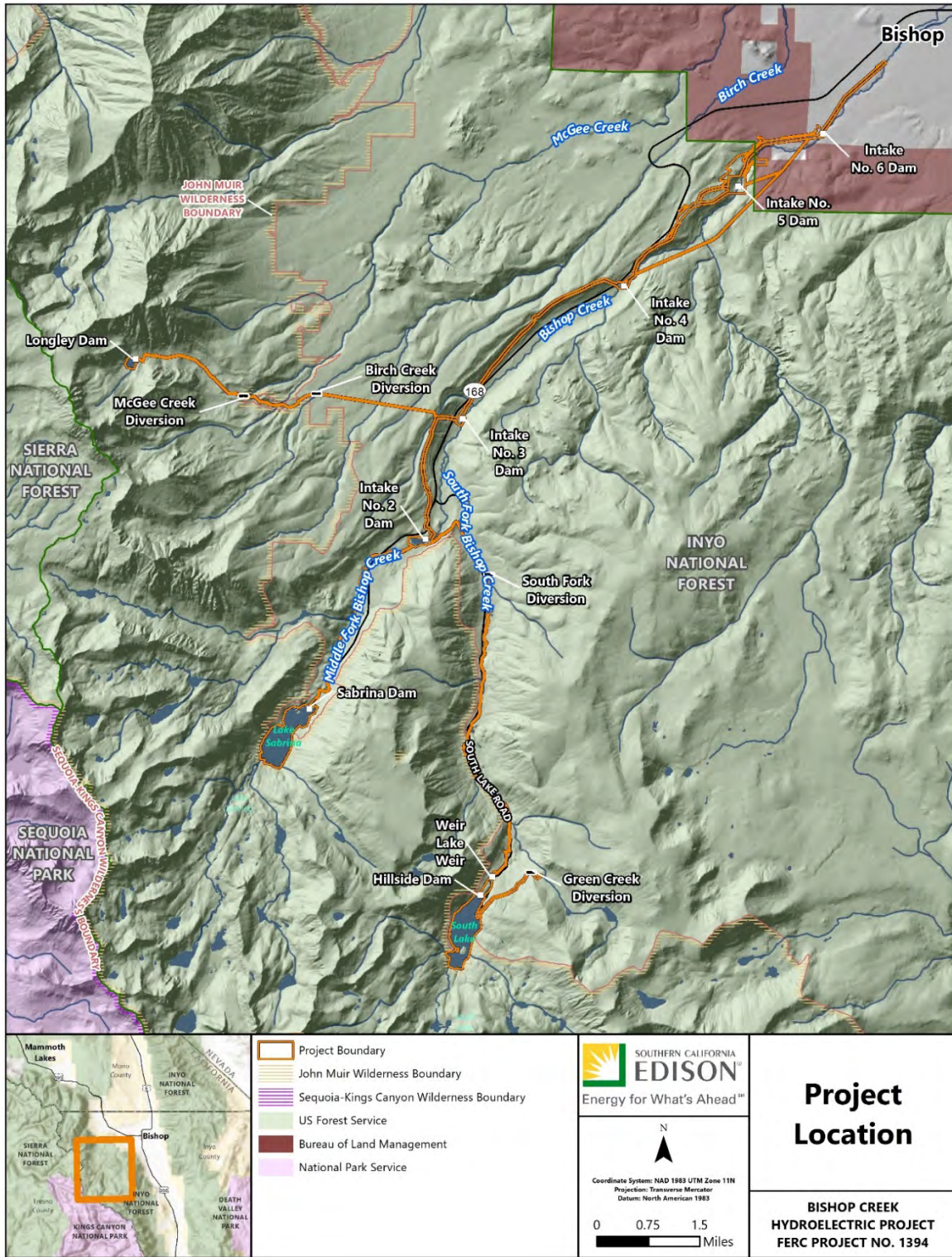


FIGURE 1-1 PROJECT LOCATION MAP

## 2.0 PROJECT NEXUS

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Although the Project is located in a relatively clean granitic watershed with limited factors to impact water quality, Stakeholders have expressed a need to establish baseline conditions so that there may be a point of reference moving forward. Water storage and diversion activities could affect water quality in Project waters or contribute to water quality issues downstream.

The goals and objectives of this study are:

- Monitor water quality<sup>1</sup> for 2 years on a regular basis at multiple monitoring sites:
  - Above-Project: establish reference baseline conditions of inflow from natural runoff in the watershed
  - In-Project: assess how/if water quality changes throughout various facilities within the Project Area (i.e., various depths and locations in South Lake and Lake Sabrina, powerhouse discharges)
  - Below-Project: assess any/all potential impacts Project operations may have on water quality that is leaving the Project Area
- Monitor water temperature for 2 years on a regular basis at multiple monitoring sites
  - Above-Project: establish reference baseline conditions of inflow from natural runoff in watershed
  - In-Project: assess how/if water temperature changes throughout various facilities within Project Area (various depths and locations in South Lake and Lake Sabrina, powerhouse discharges)
  - Below-Project: assess any/all impacts Project operations may have on water temperature that is leaving the Project Area
- Ensure that future Project facilities and operations are:
  - Consistent with the water quality goals and objectives for Bishop Creek in the Water Quality Control Plan (Basin Plan) for the Lahontan Region (LRWQCB 1995)
  - Consistent with the desired conditions described in the 2018 Land Management Plan for the Inyo National Forest for Social and Economic Sustainability and Multiple Uses with the desired conditions described in “Land Management Plan for the Inyo National Forest” (USDA, 2018) as they relate to ecological sustainability and diversity of plant and animal communities.

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<sup>1</sup> For the purposes of this study, water quality is being monitored for dissolved oxygen (DO), water temperature, turbidity, conductivity, total dissolved solids, orthophosphate, nitrate, total nitrogen and E.coli.



### 3.0 REVIEW OF EXISTING INFORMATION

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The State of California has responsibility for maintaining water quality standards through the Federal Clean Water Act (CWA). The State Water Resources Control Board (SWRCB) and Lahontan Regional Water Quality Control Board (LRWQCB) are responsible for the protection of beneficial uses of water resources within its jurisdiction and uses planning, permitting and enforcement authorities to meet this responsibility. Every water body within the jurisdiction of the LRWQCB is designated a set of beneficial uses that are protected by appropriate water quality objectives.

For smaller tributary streams in which beneficial uses are not specifically designated, they are granted with the same beneficial uses as the streams, lakes, or reservoirs to which they are a tributary. Table 3-1 lists the water bodies to which this Project drains and their beneficial use designations.

The Basin Plan defines the beneficial use abbreviations as the following:

- **Municipal and Domestic Supply (MUN)** – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- **Agricultural Supply (AGR)** – Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
- **Industrial Process Supply (PRO)** – Uses of water for industrial activities that depend primarily on water quality.
- **Industrial Service Supply (IND)** – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
- **Ground Water Recharge (GWR)** - Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- **Freshwater Replenishment (FRSH)** - Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
- **Hydropower Generation (POW)** – Uses of water for hydroelectric power generation.
- **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, whitewater activities, fishing, or use of natural hot springs.

- **Non-Contact Water Recreation (REC-2)** – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
- **Commercial and Sportfishing (COMM)** - Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.
- **Cold Freshwater Habitat (COLD)** – 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.
- **Wildlife Habitat (WILD)** – Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- **Preservation of Biological Habitats of Special Significance (BIOL)** - Beneficial uses of waters that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, and Areas of Special Biological Significance (ASBS), where the preservation and enhancement of natural resources requires special protection.
- **Spawning, Reproduction, and/or Early Development (SPWN)** – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

The LRWQCB has established water quality objectives for specific beneficial water uses in the Water Quality Control Plan (Basin Plan) (LRWQCB 1995). The water quality objectives include both numeric and narrative standards for surface water based on criteria that protect both human health and aquatic life. If water quality is maintained at levels consistent with these objectives, beneficial uses are considered protected. Applicable water quality objectives and standards in the Basin Plan are provided in Table 3-2 and Table 3-3.

**TABLE 3-1 WATER BODY BENEFICIAL USE DESIGNATIONS**

SURFACE WATER BODY	Beneficial Use																					
	MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD
	Municipal and Domestic Supply	Agricultural Supply	Industrial Process Supply	Industrial Service	Groundwater Recharge	Freshwater Replenishment	Navigation	Hydropower Gen.	Water Contact Recreation	Non-Contact Water Recreation	Commercial and Sport Fishing	Aquaculture	Warm Freshwater Habitat	Cold Freshwater Habitat	Inland Saline Water Habitat	Wildlife Habitat	Special Biological Habitats	Rare, Threatened & Endangered Species	Migration of Aquatic Organisms	Spawning, Reproduction & Dev.	Water Quality Enhancement	Flood Peak Attenuation/Flood Water Storage
<b>Upper Owens Hydrologic Area Hydrologic Unit 603.20</b>																						
McGee Creek	X	X			X	X		X	X	X	X			X		X	X			X		
Bishop Creek (above intakes)	X	X						X	X	X	X			X		X				X		
Intake 2 Reservoir	X							X	X	X	X			X		X						
Bishop Creek (below intakes)	X							X	X	X	X			X		X				X		
Bishop Creek (below last Powerhouse)	X	X		X	X				X	X	X			X		X				X		

Source: LRWQCB 1995

**TABLE 3-2 WATER QUALITY OBJECTIVES FOR HYDROLOGIC UNIT 603.20 - UPPER OWENS RIVER HYDROLOGIC UNIT**

CONSTITUENT/ PARAMETER	WATER QUALITY OBJECTIVE
<b>Ammonia</b>	Shall not exceed the values in Tables 3-1 to 3-4 in LRWQCB Basin Plan.
<b>Bacteria</b>	The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliters (ml), nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml.
<b>Biostimulatory Substances</b>	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.
<b>Chemical Constituents</b>	Waters designated as MUN shall not contain concentrations of chemical constituents exceeding the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in Title 22.
<b>Chlorine, total residual</b>	For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 milligrams per liter (mg/L) or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any 6-month period.
<b>Color</b>	Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
<b>Dissolved Oxygen (DO)</b>	The DO concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum DO concentration be less than 80 percent of saturation. For waters with the beneficial uses of COLD, COLD with SPWN, WARM, and WARM with SPWN, the minimum DO concentration shall not be less than that specified in Table 3-6 of the LRWQCB Basin Plan.
<b>Floating Material</b>	Water shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
<b>Oil &amp; Grease</b>	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.
<b>pH</b>	In fresh waters with designated beneficial uses of COLD or WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters of the region, the pH shall not be depressed below 6.5 nor raised above 8.5.
<b>Radioactivity</b>	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.
<b>Sediment</b>	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
<b>Settleable Material</b>	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.
<b>Suspended Material</b>	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
<b>Tastes and Odors</b>	Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses.
<b>Temperature</b>	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses.
<b>Toxicity</b>	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal or aquatic life.
<b>Turbidity</b>	Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

Source: LRWQCB 1995.

**TABLE 3-3 WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES IN UPPER OWENS RIVER HYDROLOGIC UNIT**

SURFACE WATERS	OBJECTIVE (mg/L) <sup>a,b</sup>						
	TDS	Cl	F	B	NO <sub>3</sub> -N	Total N	PO <sub>4</sub>
Lake Sabrina	<u>10</u>	<u>2.0</u>	<u>0.10</u>	<u>0.05</u>	<u>0.2</u>	<u>0.3</u>	<u>0.03</u>
	17	3.0	0.10	0.05	0.3	0.6	0.05
South Lake	<u>12</u>	<u>3.7</u>	<u>0.10</u>	<u>0.02</u>	<u>0.1</u>	<u>0.1</u>	<u>0.03</u>
	20	4.3	0.10	0.02	0.1	0.4	0.04
Bishop Creek (Intake No. 2)	<u>27</u>	<u>1.9</u>	<u>0.15</u>	<u>0.02</u>	<u>0.1</u>	<u>0.1</u>	<u>0.05</u>
	29	3.0	0.15	0.02	0.2	0.4	0.09

<sup>a</sup> Annual average value/90th percentile value.

<sup>b</sup> Objectives are in mg/L and are defined as follows:  
 B = Boron  
 Cl = Chloride  
 F = Fluoride  
 N = Nitrogen, Total  
 NO<sub>3</sub>-N = Nitrate as Nitrogen  
 PO<sub>4</sub> = Orthophosphate, dissolved  
 TDS = Total Dissolved Solids (Total Filterable Residue)

Source: LRWQCB 1995

**SUMMARY OF SWAMP WATER QUALITY SAMPLING ON BISHOP CREEK  
AT NATIONAL FOREST BOUNDARY (STATION 603BSP111)**

PARAMETER/CONSTITUENT (A)	UNITS	NO. OF SAMPLES	MAXIMUM	MINIMUM	MEAN	BASIN STANDARDS
Oxygen, dissolved	(mg/L)	1	10.7	10.7	---	varies
Water Temperature	(deg °C)	12	16.4	2.2	9.84	NA
pH	(units)	12	<b>10.3</b>	7	7.97	6.5-8.5 (b)
Alkalinity (as CaCO <sub>3</sub> )	(mg/L)	12	44	19	30.4	NA (c)
Turbidity	(NTU)	12	1.54	0.33	0.724	5 (d)
Specific Conductance	(µS/cm)	12	104.4	40.7	74.63	900-1,600 (d)
Total Dissolved Solids	(mg/L)	12	<b>66</b>	25	<b>46.0</b>	27 (a)
Calcium	(mg/L)	12	13.7	0.6	7.99	NA
Magnesium	(mg/L)	11	1.63	0.43	1.032	NA
Sodium	(mg/L)	11	4.82	1.1	3.085	NA
Potassium	(mg/L)	10	2.86	0.31	1.636	NA
Chloride	(mg/L)	12	1.6	0.36	0.884	1.9 (a)
Sulfate (as SO <sub>4</sub> )	(mg/L)	12	9.55	3.15	6.157	250-500 (d)
Fluoride	(mg/L)	11	0.143	0.046	0.1014	0.15 (a)
Boron	(mg/L)	12	<b>0.481</b>	0.0058	0.1271	0.2 (a)
Nitrate and Nitrite (as N)	(mg/L)	11	0.0475	0.0065	0.01999	10 (e)
Nitrogen, Total	(mg/L)	12	<b>0.125</b>	0.049	0.0794	0.1 (a)
Phosphorus as P	(mg/L)	9	0.0094	0.0054	0.00752	NA
Orthophosphate as P	(mg/L)	12	0.0132	0.0051	0.00880	0.05 (a)
Fecal Coliform	cfu/100 ml(f)	27	<b>66</b>	<b>1</b>	<b>8.9</b>	20 (g)
E. coli	cfu/100 ml	24	<b>61</b>	<b>1</b>	<b>8.0</b>	100/320 (h)

Notes:

- a – Basin Plan for Bishop Creek at Intake No. 2.
- b – United States Environmental Protection Agency (USEPA) secondary standard for pH.
- c – NA = Not Applicable – no current MCL.
- d – CDWP secondary MCL.
- e – California Drinking Water Program primary maximum contaminant level (MCL).
- f – cfu - colony forming units
- g – Lahontan Basin Plan
- h – Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California

Source: CEDEN 2018



## 4.0 STUDY AREA

Figure 4-1 below shows the proposed study area for the Bishop Creek Water Quality Study.

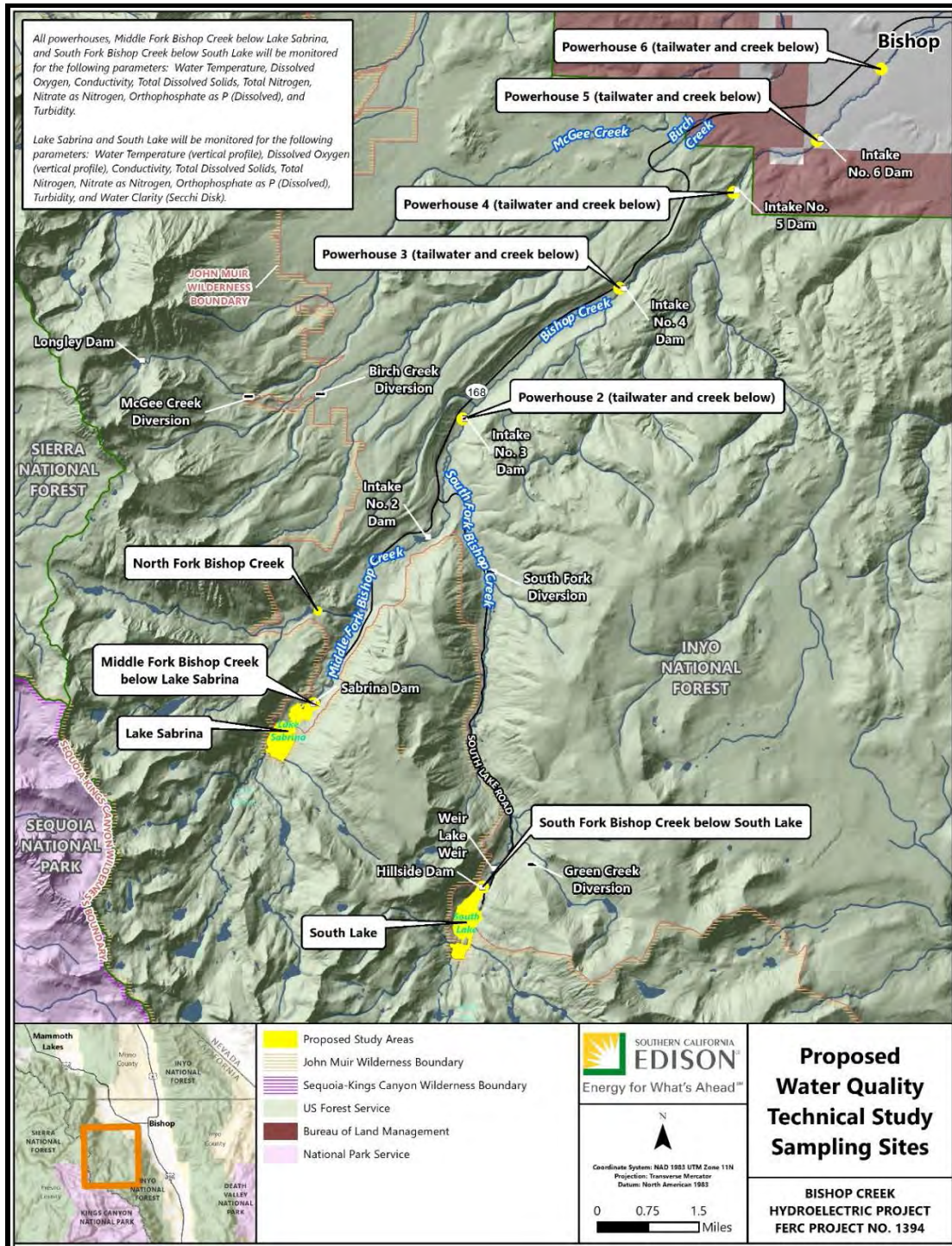


FIGURE 4-1 PROPOSED WATER QUALITY TECHNICAL STUDY AREA



## 5.0 METHODS

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### 5.1 PARAMETERS TO BE MONITORED

- Water Temperature (in °C)
- Total Dissolved Solids (TDS)
- Dissolved Oxygen (DO) (in mg/l)
- Conductivity (in µmhos/cm)
- Total Dissolved Solids (TDS)
- Total Nitrogen
- Nitrate (NO<sub>3</sub>) as Nitrogen
- Orthophosphate (PO<sub>4</sub>) as P (dissolved)
- Turbidity
- Water Clarity (Secchi Disk)
- Escherichia coli (E. coli)

### 5.2 VERTICAL PROFILES OF DISSOLVED OXYGEN AND WATER TEMPERATURE

Vertical profiles of DO and temperature will be collected at the deepest location(s) in South Lake and Lake Sabrina. The purpose of the survey is to identify the timing, extent and duration of any lake stratification. Vertical profiles of DO and temperature will be taken monthly in June and ending in October. The following schedule is proposed for collecting the vertical profiles:

- June, July, August, September, and October

The following sampling locations are proposed:

- Deepest point in Lake Sabrina (estimated at 78-feet-deep at full capacity)
- Deepest Point in South Lake (estimated at 130-feet-deep at full capacity)

When collecting DO and temperature profiles, the same sampling location will be visited each time so that the relative change in the profile (DO and temperature) can be determined throughout the summer. DO and temperature readings will be taken every meter from the water surface to the lake bottom using equipment that is approved by the U.S. Forest Service (USFS). Lake surface elevation will also be recorded during each sampling date.

### 5.3 CREEK DISSOLVED OXYGEN AND TEMPERATURE SAMPLING

It is proposed that creek sampling will be conducted during the same periods as the lake sampling, monthly in June and October and bi-monthly from early July and terminating in late September. DO and temperature measurements would be sampled mid-depth in the middle, if

accessible, otherwise adjacent to the bank of the stream. Temperature data will be recorded using a calibrated hand-held digital thermometer and DO concentrations will be sampled with equipment approved by the USFS. The following sampling locations are proposed:

- North Fork Bishop Creek (background)
- Middle Fork Bishop Creek below Lake Sabrina
- South Fork Bishop Creek below South Lake
- Bishop Creek below Powerhouse No. 2
- Tailwater of Powerhouse No. 2
- Bishop Creek below Powerhouse No. 3
- Tailwater of Powerhouse No. 3
- Bishop Creek below Powerhouse No. 4
- Tailwater of Powerhouse No. 4
- Bishop Creek below Powerhouse No. 5
- Tailwater of Powerhouse No. 5
- Bishop Creek below Powerhouse No. 6
- Tailwater of Powerhouse No. 6

#### **5.4 SAMPLING FOR SECCHI DISK, TURBIDITY, CONDUCTIVITY, TOTAL DISSOLVED SOLIDS, ORTHOPHOSPHATE, TOTAL NITROGEN, NITRATE AND E. COLI**

##### **5.4.1 SECCHI DISK READINGS**

- Sampling Duration: Summer of 2020 and 2021
- Sampling Period: June, July, August, September and October
- Sampling Locations: within deepest portion of Lake Sabrina and South Lake at the same locations used for temperature and DO profiles
  - Sampling Protocol: One sample per site using the Secchi disk to approximate depth of the euphotic zone/light penetration

##### **5.5 TURBIDITY, CONDUCTIVITY, TOTAL DISSOLVED SOLIDS, ORTHOPHOSPHATE, TOTAL NITROGEN AND NITRATE**

- Sampling Duration: Summers of 2020 and 2021
- Sampling Frequency: a minimum of 1 per month during June, July, August and late September
- Sampling Locations
  - Lakes
    - Within a deep hole of Lake Sabrina and South Lake
    - Sampling will be performed at two points: one above and one below the thermocline

- Riverine Segment
  - North Fork Bishop Creek (background)
  - Middle Fork Bishop Creek below Lake Sabrina
  - South Fork Bishop Creek below South Lake
  - Bishop Creek below Powerhouse No. 2
  - Bishop Creek below Powerhouse No. 3
  - Bishop Creek below Powerhouse No. 4
  - Bishop Creek below Powerhouse No. 5
  - Bishop Creek below Powerhouse No. 6

Sampling Protocol: U.S. Geological Survey (USGS) sampling protocol and procedures

### **5.5.1 E. COLI<sup>2</sup>**

- Sampling Duration: Summers of 2020 and 2021
- Sampling Frequency: six separate sample events starting July 1 and ending August 15
- Sampling Locations
  - South Lake and Lake Sabrina
    - Adjacent to the boat ramp
  - Intake #2 Forebay
    - Any easily accessible location adjacent to shore

### **5.5.2 GENERAL**

At each of the creek sampling events the following information would be recorded:

- Streamflow (in cubic feet per second [cfs])
- Air temperature
- Wind speed and direction
- Percent cloud cover
- Date, duration and amount of most recent precipitation event (if known or obtainable)

---

<sup>2 2</sup> If any sample detects greater than 50 col/100 ml of E. coli, microbial source tracking methods (MST [qPCR]) will be performed to assess if the E. coli originates from humans.

**TABLE 5-1 LOCATIONS, PARAMETERS AND SAMPLING FREQUENCY FOR WATER QUALITY STUDY**

LOCATION	PARAMETERS										
	Water Temperature	Dissolved Oxygen	Secchi Disk	Turbidity	Conductivity	Total Dissolved Solids	Total Kjeldahl Nitrogen (a)	Nitrite + Nitrate as N (a)	Nitrate as N	Orthophosphate as PO4	E. coli
LAKES											
Lake Sabrina											
Deepest Point	J, Jy, A, S, O (b, c)	J, Jy, A, S, O (b)	J, Jy, A, S, O	NA (d)	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Adjacent to Boat Ramp	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	July 1-August 15 (e)
South Lake											
Deepest Point	J, Jy, A, S, O (b)	J, Jy, A, S, O (b)	J, Jy, A, S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Adjacent to Boat Ramp	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	July 1-August 15 (e)
Intake # 2 Forebay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	July 1-August 15 (e)
SURFACE FLOWS											
North Fork Bishop Creek (background)	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Middle Fork Bishop Creek below Lake Sabrina	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
South Fork Bishop Creek below South Lake	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Bishop Creek below Powerhouse No. 2	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Bishop Creek below Powerhouse No. 3	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Bishop Creek below Powerhouse No. 4	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Bishop Creek below Powerhouse No. 5	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Bishop Creek below Powerhouse No. 6	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	J, Jy, A, S	NA
Tailwater of Powerhouse No. 2	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailwater of Powerhouse No. 3	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailwater of Powerhouse No. 4	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailwater of Powerhouse No. 5	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailwater of Powerhouse No. 6	J, 2Jy, 2A, 2S, O	J, 2Jy, 2A, 2S, O	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Notes:**  
 (a) – Lab analysis parameters needed to calculate Total Nitrogen.  
 (b) – Vertical profile of dissolved oxygen and water temperature at the deepest point on the lake.  
 (c) – J=June, Jy=July, A=August, S=September, O=October. All locations indicated are sampled once per month unless month is preceded by a number which indicates the number of times samples will be collected during that month.  
 (d) – NA=Not Applicable.  
 (e) – A total of 6 samples will be collected and analyzed during the 45-day period,

## **6.0 SAMPLING PROCEDURES AND METHODS**

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### **6.1 SAMPLING PROCEDURES**

This section specifies the procedures for collecting surface water measurements and/or water quality samples for chemical analysis. Several methods for collecting surface water samples are available, depending on the type of surface water to be sampled (i.e. tailraces, streams, lakes). Regardless of the sample collection method used, samples will be obtained beginning with the most downstream location and proceeding upstream.

#### **6.1.1 LAKE SAMPLING**

Field measurements of dissolved oxygen and water temperature will be collected at the deepest portion of the lake based on the 1980 bathymetric survey (see Appendix A). The maximum depth for Lake Sabrina and South Lake are 78 feet and 130 feet, respectively. Field measurements of DO and water temperature measurements will be collected starting at 0.5 meter below the water surface and at 1 meter below water surface and continuing in 1 meter increments until the total depth of the lake is obtained. Measurements will be recorded on the appropriate forms and/or field notebook.

Secchi disk measurements will be collected at the same location as the field measurements for DO and water temperature. The Secchi depth measurement procedures are summarized in Standard Operating Procedure (SOP) for surface water sampling (SW-001) in Appendix B.

If a thermocline<sup>3</sup> is identified from the monthly field measurements of water temperature and dissolved oxygen, water quality samples for laboratory analysis and field measurement of conductivity will be collected at above and below the thermocline. If no thermocline is identified, water samples will be collected at one-half of the Secchi depth and 80 percent of the total depth of the lake at the time of sampling.

Water samples for conductivity, TDS, orthophosphate, total nitrogen and nitrate will be collected using either a peristaltic pump or discrete depth sampler (Kemmerer or Van Dorn bottle) in

---

<sup>3</sup> A thermocline is the horizontal plane in a thermally stratified lake located at the depth where water temperature decreases most rapidly (greater than 1 °C per meter) with depth.

accordance with SOP for surface water sampling (SW-001) in Appendix B. Water samples for E. coli and MST (qPCR) will be collected near shore using a grab sampling method.

**6.1.2 SURFACE WATER SAMPLING**

Surface water sampling refers to the collection of water samples for the purposes of field or laboratory testing of water collected from a flowing water site. A flowing water site can refer to streams and tailraces in which water flows unidirectionally.

Field measurements of dissolved oxygen, turbidity, conductivity, and water temperature will be collected from straight reaches having uniform flow, and having a uniform and stable bottom contour, and where constituents are well mixed along the cross-section. Field measurements will be collected in accordance with SOP for surface water sampling (SW-001) in Appendix B.

Water samples for laboratory testing will be collected using either the grab sample method or swing sampler in accordance with SOP for surface water sampling (SW-001) in Appendix B.

**6.2 FIELD ANALYTICAL METHODS**

Field measurements of dissolved oxygen, turbidity, conductivity, and water temperature will be conducted using the methods indicated in Table 6-1 and with SOP for surface water sampling (SW-001) in Appendix B.

**TABLE 6-1 FIELD METHODS**

<b>ANALYSIS</b>	<b>METHOD</b>	<b>METHOD REPORTING LIMIT</b>
Dissolved Oxygen in mg/L	EPA 360.1	0.1 mg/L
Water Temperature in °C	EPA 170.1	0.1 °C
Conductivity in µmhos/cm @25 °C	EPA 120.1	1 µS/cm
Turbidity in NTUs	EPA 180.1	varies
Notes: mg/L=milligrams per liter; °C=degrees Centigrade; µmhos/cm=micro-mhos per centimeter; NTU=Nephelometric turbidity units.		

### 6.3 FIELD CALIBRATION METHODS

The equipment used in collecting field data will include a variety of instruments. Proper maintenance, calibration, and operation of each instrument will be the responsibility of the individual assigned to each task. Instruments and equipment used during the study will be maintained, calibrated, documented for calibration, and operated according to the manufacturers' guidelines and recommendations and SOP for field instrument calibration (SW-002) in Appendix B. A list of instruments requiring calibration and records of instrument calibration will be maintained for the duration of the study in a calibration notebook. Any required service, repairs, or replaced parts will be noted and resolved as needed.

### 6.4 Laboratory Methods

In general, the selected laboratory will adhere to those recommendations promulgated in Title 21, Code of Federal Regulations (CFR) Part 58, Good Laboratory Practices; and criteria described in Methods for Chemical Analysis of Water and Wastes (EPA, 1979; EPA-600/4-79-202). Water samples collected for chemical analysis during this project will be tested in accordance with the standard analytical procedures established by the EPA (Methods for Chemical Analysis of Water and Wastes (EPA, 1979; EPA-600/4-79-202), American Society for Testing and Materials, or Standard Methods for the Examination of Water and Wastewater and are indicated in Table 6-2.

**TABLE 6-2 LABORATORY METHODS**

ANALYSIS	METHOD	METHOD REPORTING LIMIT (units)	HOLDING TIME
Total Dissolved Solids	SM 2540C	10 mg/L	7 days
Total Nitrogen by calculation	calculation	---	---
Nitrite + Nitrate as N	EPA 353.2	0.20 mg/L	28 days
Total Kjeldahl Nitrogen	EPA 351.2	0.10 mg/L	28 days
Nitrate as N	EPA 300.0	0.11 mg/L	2 days
Orthophosphate as P	EPA 365.3	0.10 mg/L	2 days
E. coli	SM 9222G	20 col/100 ml	8 hours
MST (qPCR)	BacHum or HF183 (SNARL)	---	48 hours
Notes:			



SM=Standard Methods for the Examination of Water and Wastewater; EPA= Method for Chemical Analysis of Waters and Wastes, EPA-600/4-79-020; SNARL=Sierra Nevada Aquatic Research Laboratory (see SNARL, 2015, Appendix E); N=Nitrogen; P=Phosphorus.

The samples for each analytical parameter will be collected and preserved in the appropriate sample containers as presented in Table 6-3. The sample containers provided by the analytical laboratories will be new, pre-cleaned, pre-loaded with the appropriate preservative, and delivered in a clean cooler.

Due to the limited holding time for both E. coli and MST (qPCR), the Sierra Nevada Aquatic Research Laboratory (SNARL) will be used to conduct the E. coli and MST (qPCR) analysis. .

**TABLE 6-3 SAMPLING CONTAINER AND PRESERVATION REQUIREMENTS**

ANALYSIS	METHOD	CONTAINER	PRESERVATION
Total Dissolved Solids	SM 2540C	500 ml -poly	<6°C
Nitrite + Nitrate as N	EPA 353.2	250 ml - poly	<6°C, H <sub>2</sub> SO <sub>4</sub>
Total Kjeldahl Nitrogen	EPA 351.2	250 ml - poly	<6°C, H <sub>2</sub> SO <sub>4</sub>
Nitrate as N	EPA 300.0	60 ml - poly	<6°C
Orthophosphate as P	EPA 365.3	250 ml - poly, filtered	<6°C
E. coli	SM 9222G	100 ml, glass	<6°C
MST (qPCR)	BacHum or HF183 (SNARL)	1000 ml, polypropylene	<10°C

Notes:  
SM=Standard Methods for the Examination of Water and Wastewater; EPA= Method for Chemical Analysis of Waters and Wastes, EPA-600/4-79-020; SNARL=Sierra Nevada Aquatic Research Laboratory (see SNARL, 2015, Appendix E); N=Nitrogen; P=Phosphorus; poly=polyethylene; ml=milliliters; °C= degrees centigrade; H<sub>2</sub>SO<sub>4</sub>=sulfuric acid.

## 6.5 SAMPLE LABELING AND CHAIN-OF-CUSTODY

Sample labels will be completed for each sample using indelible ink. The labels shall include sample number and location, type of sample, date and time of sampling, sampler's name (or initials), preservation method, and analyses to be performed. The completed sample labels will be affixed to each sample container.

A chain-of-custody record will accompany all samples. During transfer, individuals relinquishing and receiving the samples will sign, date, and note the time on the record. The chain-of-custody form will document the sample custody transfer from the sampler, through a courier, to the laboratory. Additionally:

- Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis with a separate chain-of-custody record accompanying each shipment. A copy of the chain-of-custody record will be retained in the project files.
- The laboratory will accept custody of the shipped samples and verify that the information on the sample identification tags matches the chain-of-custody records.
- The laboratory will use the sample identification number or assign a unique laboratory number to each sample, and ensure that all samples are transferred to the proper analyst or stored in an appropriate and secure area.

All laboratory water quality samples will be managed in accordance with SOP for Sample Management (SW-003) in Appendix B.

## 7.0 PROJECT SCHEDULE

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The projected schedule for implementation of the water quality study is presented in Table 7-1.

**TABLE 7-1 BISHOP CREEK WATER QUALITY STUDY PLAN SCHEDULE**

<b>ANALYSIS</b>	<b>RESPONSIBLE ENTITY</b>	<b>SCHEDULE MILESTONES</b>
File NOI/PAD with FERC along with Final Study Plans	SCE	05/01/19
FERC Holds Scoping and Site Visit	FERC	05/30/19 – 06/29/19
FERC Director's Study Plan Determination	FERC	01/10/20 - 02/09/20
First Field Season	SCE	2020
Second Field Season	SCE	2021
Final Study Report	SCE	2022
License Application	SCE	June 2022

## 8.0 REFERENCES

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American Public Health Association, American Water Works Association, Water Environment Federation, 2012. Standard Methods for the Examination of Water and Wastewater, 22<sup>nd</sup> Edition.

California Regional Water Quality Control Board Lahontan Region (LRWQCB). 1995. Water Quality Control Plan for the Lahontan Region (Basin Plan).

SNARL, 2015. Assessment of Bacterial Water Quality in the Lahontan Region. State Water Resources Control Board Contract Number: 12-067-160. October 2012-March 2015.

USEPA, EMSL-Cincinnati, Method for Chemical Analysis of Waters and Wastes, EPA-600/4-79-020 (Cincinnati, OH, 1983).

U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A10, available online at <http://pubs.water.usgs.gov/twri9A>.

**APPENDIX A**  
**BATHYMETRIC SURVEY OF LAKE SABRINA AND SOUTH LAKE**

**APPENDIX B**  
**STANDARD OPERATING PROCEDURES (SOPs)**

**APPENDIX C**  
**FIELD FORMS**



**APPENDIX A**  
**BATHYMETRIC SURVEY OF LAKE SABRINA AND SOUTH LAKE**



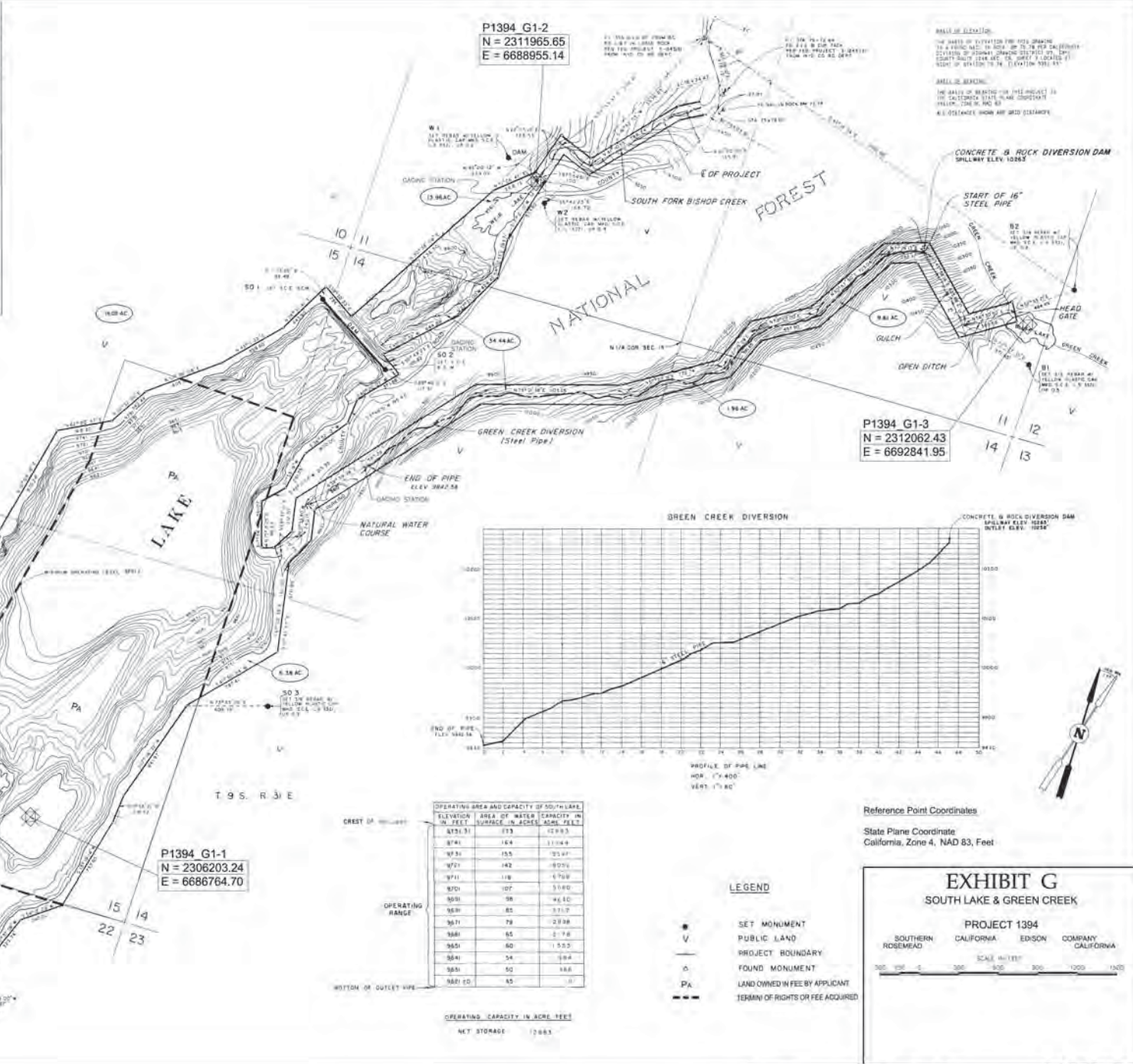
I, Lawrence J. Kelley, Supervising Licensed Surveyor of Southern California Edison Company, do hereby certify that this map was prepared under my general supervision and is based upon maps of the United States Geological Survey, the Bureau of Reclamation of the Department of the Interior, The Department of Public Works of the State of California, and upon surveys made over a period of years by surveyors employed by Southern California Edison Company, and that the data obtained there from are correctly shown upon this map as accurately as possible.



LAWRENCE J. KELLEY, P.L.S. No. 7373, California  
SOUTHERN CALIFORNIA EDISON COMPANY

P1394 G1-2  
N = 2311965.65  
E = 6688955.14

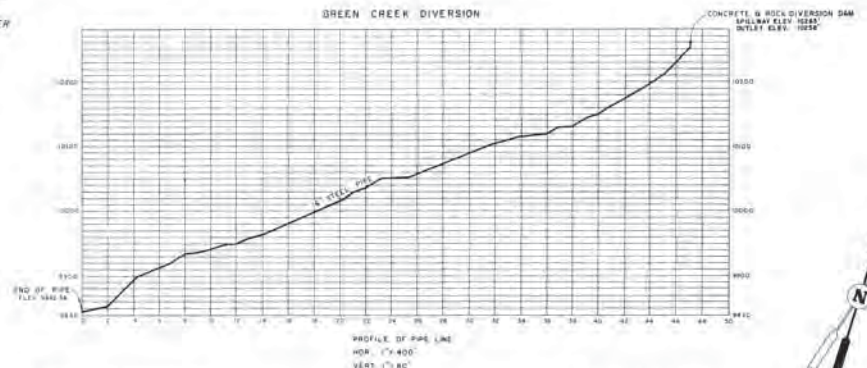
SCALE OF DISTANCE:  
ONE INCH ON THIS DRAWING IS EQUAL TO 100 FEET ON THE GROUND.  
ELEVATION OF POINTS SHOWN ON THIS DRAWING IS IN FEET ABOVE MEAN SEA LEVEL.  
DISTANCE SHOWN ARE GRID DISTANCES.  
ALL DISTANCES SHOWN ARE GRID DISTANCES.



P1394 G1-3  
N = 2312062.43  
E = 6692841.95

OPERATING RANGE	OPERATING AREA AND CAPACITY OF SOUTH LAKE
8741	164 1104.9
8731	155 95.47
8721	142 807.6
8711	129 676.9
8701	107 510.0
8691	98 464.0
8681	85 371.2
8671	79 293.8
8661	65 217.8
8651	60 155.5
8641	54 109.4
8631	50 84.8
8621	45 61.0

OPERATING CAPACITY IN ACRES FEET  
NET STORAGE 12683



Reference Point Coordinates  
State Plane Coordinate  
California, Zone 4, NAD 83, Feet

- LEGEND**
- SET MONUMENT
  - V PUBLIC LAND
  - PROJECT BOUNDARY
  - △ FOUND MONUMENT
  - PA LAND OWNED IN FEE BY APPLICANT
  - EIGHTH OF RIGHTS OR FEE ACQUIRED

**EXHIBIT G**  
**SOUTH LAKE & GREEN CREEK**

PROJECT 1394  
SOUTHERN CALIFORNIA EDISON COMPANY CALIFORNIA

SCALE 1"=100'



**DATE OF ELEVATION**  
 THE BASIS OF ELEVATION FOR THIS DRAWING IS A  
 FORMER DAILY DIVISION OF WISDOM'S BRASS STEEL  
 FLOW OR CONCRETE (41 x 65 x 1) LOCATED FROM  
 61.4' P.P.M. AT THESE POINTS: 1) 1.541' 10" NORTH  
 2) 1.541' 10" NORTH OF NORTHERN ROAD 3) 1.541'  
 INTERSECTION OF CAMP SERRANO CITY. 885' 51"

**LEGEND**

- △ FOUND MONUMENT
- SET MONUMENT
- V PUBLIC LAND
- ▭ PROJECT BOUNDARY
- ▬ STATE HIGHWAY

L. Lawrence J. Kelley, Registered Licensed Surveyor of Southern California Edison Company, do hereby certify that this map was prepared under my general supervision and is based on maps of the United States Geological Survey, the Bureau of Reclamation and the Department of the Interior, the Department of Public Works of the State of California, and on various surveys made over a period of years by surveyors employed by Southern California Edison Company, and that the data obtained therefrom are correctly shown upon this map as accurately as possible.



LAWRENCE J. KELLEY, P.L.S. No. 7072, California  
 SOUTHERN CALIFORNIA EDISON COMPANY

**Reference Point Coordinates**

State Plane Coordinate  
 California, Zone 4, NAD 83, Feet:

25 30  
 36 31

INYO

NATIONAL

LAKE

FOREST

SABRINA

T.B.S. R.30 E. M.D.M.  
 T.B.S. R.31 E. M.D.M.

T.B.S. R.31 E. M.D.M.

T.9 S. R.31 E. M.D.M.

P1394 G5-3  
 N = 2323253.07  
 E = 6672181.28

P1394 G5-1  
 N = 2325219.63  
 E = 6675211.82

P1394 G5-2  
 N = 2320171.01  
 E = 6673332.12

OPERATING AREA AND CAPACITY OF DAMMING LAKE		
ELEVATION IN FEET	AREA OF WATER SURFACE IN ACRES	CAPACITY IN ACRE FEET
9,311.00	174	7500
9,322	179	5540
9,332	184	3832
9,352	193	2328
9,382	198	903
9,402	21	33
9,472	18	3
9,088.42	48	0

OPERATING CAPACITY IN ACRE FEET	
NET STORAGE	1500

SR 5  
 SET 3/4" BEARIN W/  
 YELLOW PLASTIC  
 CAP AND I.C.E. I.S.  
 181.11' UP 2.2'

SR 4  
 SET 3/4" BEARIN W/  
 YELLOW PLASTIC  
 CAP AND I.C.E. I.S.  
 181.11' UP 2.2'

(UNSURVEYED)

**EXHIBIT G**  
**LAKE SABRINA DAM**

PROJECT 1394

SOUTHERN CALIFORNIA EDISON COMPANY CALIFORNIA

SCALE IN FEET  
 0 500 1000 1500



**APPENDIX B**  
**STANDARD OPERATING PROCEDURES (SOPs)**

SOP SW-001  
DATE: 11/21/2019  
REV: 1.0

**STANDARD OPERATING PROCEDURE  
FOR  
SURFACE WATER SAMPLING**

## SURFACE WATER SAMPLING

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## **SURFACE WATER SAMPLING**

### **1 SCOPE AND APPLICATION**

The purpose of this Standard Operating Procedure (SOP) is to set guidelines for the collection of field measurements and collection of water samples for laboratory analysis. These standard operating procedures may be varied or changed as required, dependent on site conditions, and equipment limitations. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

### **2 METHOD SUMMARY**

In order to obtain a representative surface water sample for chemical analysis it is important to collect the sample from either a stream or lake using appropriate equipment methods. The most common of surface water sampling technique is grab sampling the water source. For streams, site conditions may prevent wading into the stream to collect a sample safely and sample tools such as a swing sampler will be employed. For lakes, it is expected that either a peristaltic pump with tubing or a discrete depth sampler will be employed to collect the water sample. Once sampling is completed, the collected water will be placed into the correct laboratory-cleaned sample containers. Sampling may be conducted with any of the above listed equipment.

### **3 INTERFERENCES AND POTENTIAL PROBLEMS**

There are several potential interferences and problems that can potentially adversely affect calibration of instruments. These include the following:

- Neglect in following procedures required for calibration;
- Equipment not properly warmed up before calibration;
- Equipment or calibration media too hot or cold during calibration;
- Use of diluted or old calibration standard media that are no longer of the concentration reported;
- Excessively worn or damaged probes/equipment resulting erroneous readings;
- Weak batteries.

### **4 MATERIALS**

The following materials will be available, as required, during surface water sampling.

- Health and safety equipment (as required by the Health and Safety Plan);
- Distilled water;
- Boat;

## SURFACE WATER SAMPLING

- Rope;
- Surveyor's rod, weight and/or 6-foot rule;
- Duct tape;
- Measuring tape;
- Thermometer;
- Swing sampler with 12-foot extension;
- Secchi disk and rope with meter markings;
- Field notebook and/or field forms;
- Conductivity/water temperature meter;
- Dissolved oxygen meter
- Turbidity meter
- 0.45 micron membrane in-line disposable filter;
- Appropriate sampling containers and forms;
- Appropriate preservatives (as required);
- Coolers with ice or Blue ice; and
- Appropriate water sampler as specified in the implementation plan, which may include following:
  - Surface water swing sample with two-or three-piece telescoping aluminum tube or an equivalent acceptable sampling device; or
  - Peristaltic pump with a short piece of medical-grade silicone tubing and with nylon tubing

## 5 REAGENTS

Chemical reagents and solutions may be used in this procedure and should follow the requirements set forth for the laboratory analytical procedure and preservation requirements.

## 6 PROCEDURES

### ***6.1 Field Measurements of Water Temperature, Dissolved Oxygen, Conductivity, and Turbidity***

#### **6.1.1 Lake Profile Measurements**

Profiles of water temperature and dissolved oxygen (DO) will be collected at one location in each lake. Field measurements of DO and water temperature measurements will be collected starting at 0.5 meter below the water surface and at 1 meter below water surface and continuing in 1 meter increments until the total depth of the lake is obtained. Measurements will be recorded on the appropriate forms (see Appendix C) and/or field notebook. General procedures for operation of the instrument will be in accordance with the manufacturer's guidelines.



## **SURFACE WATER SAMPLING**

### **6.1.2 Stream Field Measurements**

Field measurements of water temperature, DO, conductivity, and/or turbidity will be collected in the flowing portion of the stream or tailrace. If flow conditions prevent safe access<sup>1</sup> to the flowing portion of the stream or tailrace, a swing sampler will be used to collect a representative sample and the field measurements taken from the sample container of the swing sampler. General procedures for operation of the instrument will be in accordance with the manufacturer's guidelines.

### **6.2 Secchi Disk Measurements**

Secchi disk measurements will be collected at the same location as the field measurements for DO and water temperature. The Secchi depth measurement will be collected as follows:

1. Attach a measuring tape (recommended) or rope to the Secchi disk.
2. Lower the disk straight down into the water until the disk just disappears from sight.
  - a. The sun should be behind you whenever a Secchi depth measurement is made. An exception to the rule would be when the sun is directly overhead.
  - b. Sunglasses should be removed unless conditions warrant otherwise.
  - c. If an anchor is used to prevent drifting from a sampling site, be careful not to disturb the sediments on the bottom as this could cloud the water and interfere with the reading, especially in shallow lakes.
3. If the disk is suspended with a measuring tape, note this on the field form and record the depth. If a rope suspends the disk, mark the rope at the depth at which the disk disappears.
4. Slowly raise the disk through the water column until it becomes visible. Record the depth at which the disk reappears (or mark the rope at this depth).
5. The Secchi depth is the midpoint between the disappearance and reappearance measurements. In other words, this point is one-half the distance between the point of disappearance of the disk and the point of reappearance.
6. Measure the distance from the Secchi disk to the midpoint determined in step 5.

Record the Secchi depth on the field form to the nearest centimeter or tenth of a foot, and repeat the measurement a second time for quality control.

### **6.3 Grab Sampling Procedures**

The following procedures will be used to obtain grab samples from streams:

- Step 1 Identify surface water sampling location on appropriate sampling log sheet and/or field notebook along with other appropriate information;
- Step 2 Don health and safety equipment (as required by the Health and Safety Plan);

---

<sup>1</sup> Do not attempt to wade a stream for which values of depth multiplied by velocity equal or exceed 10 feet<sup>2</sup>/second. For example, a stream only 2 feet deep but with velocities of 5 feet/second or more can be dangerous to wade (USGS, 1997).

## **SURFACE WATER SAMPLING**

- Step 3 Clean the sampling equipment with distilled water;
- Step 4 If using a swing sampler, assemble the swing sampler. Clean the swing sampler with distilled water;
- Step 5 Obtain sample by slowly submerging the sample bottle with minimal surface disturbance (in flowing streams, the bottle opening will be upstream) to a depth of approximately 6 inches below the water surface. Fill the sample bottle to neck of the container. Do not overfill;
- Step 6 If using a swing sampler, retrieve the water sample from the surface water with minimal disturbance. Fill each sample bottle to the neck of the container and secure the sample jar cap(s) tightly;
- Step 7 If sampling for orthophosphate, a filtered sample will be collected. Sample filtration for the filtered sample will be performed in the field utilizing a peristaltic pump prior to preservation. Install new medical-grade silicone tubing in the pump head. Place new nylon tubing into the temporary 1-liter sample bottle (that was filled directly from the stream or using a swing sampler) and attach to the intake side of pump tubing. Attach (clamp) a new 0.45 micron filter to the discharge side of the pump tubing (noting the correct filter flow direction). Turn the pump on and dispense the filtered liquid directly into the laboratory sample bottles.
- Step 8 Secure the sample bottle cap(s) tightly;
- Step 9 Label all sample containers as appropriate, as discussed in SOP SW-003;
- Step 10 After sample containers have been filled, measure dissolved oxygen, water temperature, conductivity, and turbidity in accordance with the manufacturer's guidelines.
- Step 11 Measure the ambient air temperature, wind speed and direction, and percent cloud cover;
- Step 12 Record required information on the appropriate forms and/or field notebook; and
- Step 13 Handle, pack, and ship the samples in accordance with the procedures in SOP SW-003.

### **6.4 Surface Water Sampling at Depth from Lakes**

To obtain surface water samples at depth from lakes (including South Lake and Lake Sabrina), a peristaltic pump or depth discrete sampler will be used, and the following procedures will be followed:

- Step 1 Identify sampling location on appropriate sampling log sheet and/or field notebook along with other appropriate information;
- Step 2 Don personal protective equipment (as required by the Health and Safety Plan);
- Step 3 Clean the sampling equipment with distilled water;
- Step 4 Install clean, medical-grade silicone tubing in the pump head, as per the manufacturer's instructions. Allow sufficient tubing on the discharge side to facilitate convenient dispensation of liquid into sample bottles and only enough

## **SURFACE WATER SAMPLING**

- on the suction end for attachment to the intake line. This practice will minimize sample contact with the silicone pump tubing;
- Step 5 Select the length of nylon tubing necessary to reach the required sample depth and attach to intake side of pump tubing. Taping the nylon tube to a surveyor's rod or weight will facilitate reaching the required depth;
- Step 6 If possible, allow several liters of sample to pass through the system before actual sample collection;
- Step 7 Both a filtered (orthophosphate) and unfiltered samples (total dissolved solids, Nitrate, nitrite+nitrate, and total Kjeldahl nitrogen) will be collected. Sample filtration for the filtered sample will be performed in the field first utilizing a peristaltic pump. Install new medical-grade silicone tubing in the pump head. Place new nylon tubing and attach to the intake side of pump tubing. Attach (clamp) a new 0.45 micron filter to the discharge side of the pump tubing (noting the correct filter flow direction). Turn the pump on and dispense the filtered liquid directly into the laboratory sample bottle;
- Step 8 After sample collection, follow steps 8 through 13 described in the preceding Section 6.3; and
- Step 9 All tubing will be cleaned using distilled water between sampling locations.

## **7 PERSONNEL QUALIFICATIONS**

All field samplers are required to be familiar with H&S plan prior to engaging in any field collection activities. In addition, field personnel should be familiar with the calibration procedures by training and or reading the instruction manual for the instrument and actually performing the calibration procedure.

## **8 HEALTH AND SAFETY**

During sampling activities, field personnel will follow the requirements of the Project Health and Safety Plan. The required safety equipment and procedures will be strictly followed.

## **9 QUALITY ASSURANCE/QUALITY CONTROL**

The following general quality assurance/quality control (QA/QC) procedures apply:

1. All data must be documented on field data sheets, surface water data forms, or within personal or site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the implementation plan.

## SURFACE WATER SAMPLING

3. After calibration, all instruments should be tested in normal operating mode by taking a reading in the calibration media and the results recorded.
4. Calibration and verification that instruments are working properly should be carried out prior to entering the field when ever possible and reverified in the field if site conditions warrant by testing the instrument in the proper calibration media.
5. Calibration media should also be checked periodically against a new calibration media and verified not to be expired if they have a certain shelf life.

## 10 REFERENCES

Canadian Standards Association (CSA) (<http://www.csa.ca>) Standard 22.2 No. 157

National Fire Protection Agency (<http://www.nfpa.org/index.html>)

Underwriter's Laboratories, Inc. (<http://www.ul.com/hazloc/define.htm>) Standard UL 913.

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U.S. EPA Environmental Response Team, Standard Operating Procedures, dated 02/11/01, SOP 2043.

U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A10, available online at <http://pubs.water.usgs.gov/twri9A>.

SOP SW-002  
DATE: 05/06/2019  
REV: 1.0

**STANDARD OPERATING PROCEDURE  
FOR  
FIELD INSTRUMENT CALIBRATION**

## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

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## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

### **1.0 SCOPE AND APPLICATION**

The purpose of this Standard Operating Procedure (SOP) is to set guidelines for the calibration of field instruments that would be used to record/collect information during surface water sampling activities. These standard operating procedures may be varied or changed as required, dependent on site conditions, and equipment limitations. In all instances, the actual procedures employed will be documented and described in an appropriate site report. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

A significant number of field activities involve usage of electronic instruments to monitor for environmental screening purposes. It is imperative the instruments are used and maintained properly to optimize their performance and minimize the potential for inaccuracies in the data obtained.

This SOP provides guidance on the usage, maintenance and calibration of electronic field equipment, whether for equipment owned by the Consultant, or equipment obtained from a rental agency.

### **2.0 METHOD SUMMARY**

In order to obtain accurate readings and measurements of various parameters measurement instruments must be in good working order and be properly calibrated. Proper calibration may depend on the media or compound to be measured. Most types of equipment require periodic calibration but the frequency can vary significantly between the types of equipment and various manufacturers. Different types of instruments require different types of calibration but calibration of similar instruments typically follow similar procedures that may involve a single procedure or repeating a procedure in order to obtain proper calibration.

Calibration also generally requires use of a liquid or gas calibration media that is of known quantity or concentration. When specific solutions or gases are required for calibration, the person performing the calibration must be careful to ensure that the calibration media used have not expired, been diluted or otherwise changed and are of the concentration reported.

Instruments should be calibrated in accordance with and as frequently as recommended in the manufactures' recommendations or the implementation plan. After calibration, the equipment it should be checked against the calibration media while in its normal operating mode to verify it is reading correctly and within the acceptable range. If after calibration the instrument is not reading to within the acceptable range to which it was calibrated, it should be recalibrated and rechecked against the calibration media. If after repeating proper calibration procedures the instrument still does not read properly, the calibration media should be replaced and/or the instrument serviced by a factory authorized service facility. Calibration can also be periodically checked this way during normal use to verify the need for recalibration.

## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

### **3.0 INTERFERENCES AND POTENTIAL PROBLEMS**

There are several potential interferences and problems that can potentially adversely affect calibration of instruments. These include the following:

- Neglect in following procedures required for calibration;
- Equipment not properly warmed up before calibration;
- Equipment or calibration media too hot or cold during calibration;
- Use of diluted or old calibration standard media that are no longer of the concentration reported;
- Excessively worn or damaged probes/equipment resulting erroneous readings;
- Weak batteries.

### **4.0 EQUIPMENT**

The following instruments require calibration prior to use in the field

- Water temperature meter
- Specific Conductivity meter
- Turbidity meter
- Dissolved oxygen meter

In addition, the following items may also be required:

- Manufacturer's instructions, operation and maintenance information.
- Associated calibration gases, aqueous standards, etc.
- Appropriate shipping containers to facilitate transport without damage to equipment

### **5.0 REAGENTS**

Chemical reagents and solutions may be used in this procedure and should follow the requirements set forth in the procedures manual for calibration of each of the instruments calibrated.

### **6.0 PROCEDURES**

#### **6.1 *General***

The following general procedures apply to calibration of most types of equipment.



## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

- Verify all monitoring equipment is in proper working order, and is suitable for the use it is intended for, in accordance manufacturer's recommendations.
- Verify field personnel understand they will be responsible for insuring the equipment is maintained and calibrated in the field to extent practical, or returned for office or manufacturer maintenance or calibration if warranted. Calibration is discussed in greater detail below.
- Maintain a copy of the Operating Instructions, Maintenance and Service manual for each instrument used on a project on the site at all times.
- Only personnel knowledgeable of their proper usage and calibration will operate instruments. In the event certification of training is required for specific equipment, personnel will have documentation of such certification readily available.

### **6.2 Preparation**

1. Determine the range of values for each of the parameters to be monitored, based on the existing site data or make an estimate using data from a similar site. For instruments that use calibration solutions, obtain calibration solutions that bracket the range of values expected during monitoring activities.
2. Verify that calibration media are not compromised or that the solution is beyond the recommended holding period.
3. Pre-clean equipment, and ensure that it is fully charged or batteries are in good working order.
4. Obtain, read and understand a copy of the Operating Instructions, Maintenance and Service Manual for each instrument.

#### **6.2.1 Calibration**

Checking the readout of an electronic instrument against a media of a known measure for which the instrument was intended is critical to ensure accurate readings or measurements are obtained. To adjust or calibrate an instrument to accurately read a parameter for which it was intended the instrument requires periodic calibration using an appropriate media that is of a specific known concentration. The concentrations selected for calibration will likely be based upon the concentration anticipated in the field and/or upon the range of the instrument itself. The frequency of calibration will be once per day prior to field measurement activities. Factory calibration and/or maintenance of instruments by the factory or a factory-authorized facility shall be performed as routinely recommended by the manufacturer provided the equipment is regularly used or any time the instrument appears not to operating normally.

## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

The following summarizes the general procedures for calibration of each of the types of instruments that may be used during surface water sampling activities.

### Dissolved Oxygen Meter

1. Inspect dissolved oxygen meter electrode and clean as necessary in accordance with manufacturer's guidelines. Rinse and dry probe.
2. Determine elevation and outside air temperature and take reading of oxygen in ambient air. Record reading on the calibration form.
3. If instrument can be calibrated, adjust ambient air concentration based upon the manufacturer's recommendations. Record adjustment on calibration form.

Repeat process as necessary in accordance with manufacturer's recommendations.

### Specific Conductivity Meter with Automatic Temperature Compensation (ATC)

1. Estimate specific conductivity of water to be measured from previous data.
2. Inspect specific conductivity probe and clean as necessary in accordance with manufacturer's guidelines. Rinse and dry probe.
3. Obtain calibration solution of varying specific conductivity (e.g. 84  $\mu\text{mhos/cm}$  [or  $\mu\text{S/cm}$ ] and 1,000  $\mu\text{mhos/cm}^1$ ). Verify solutions have not expired.
4. Insert probe into the lower concentration solution and allow probe temperature to stabilize and record reading on the calibration form.
5. Rinse probe with distilled water and gently dry probe before placing in the next calibration solution so as not to dilute the solution. Place probe in higher concentration calibration solution and allow probe temperature to stabilize and record reading on the calibration form.

If the readings are less or greater than 10% of the reported concentration, the instrument should be sent in for factory recalibration at the earliest possible date.

### Turbidity Meter

1. Place water of certified turbidity in pre-cleaned container of the appropriate size, or place container of calibration water of known turbidity in instrument and calibrate as required by the manufacturer's handbook. If the turbidity meter is on a probe the probe may require cleaning before insertion into the container or containers of calibration water. Calibration water should be provided by a factory authorized source.

### Water Temperature Meter

Calibration of water temperature generally needs to be performed by the manufacturer.

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<sup>1</sup> Actual calibration solution values may change depending on supplier availability.

## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

### **6.2.2 Documentation**

All instrument calibration activities will be documented by the individual who performs those activities. Appropriate details of the calibration such as the media concentrations, number of repetitions and normal reading checks will be recorded on the attached calibration form (Attachment A).

During field activities any concerns observed regarding a potential malfunction of a piece of equipment should be documented on the field logs and reported to the Project Manager, individual responsible for equipment maintenance and/or the rental company.

Any equipment sent to a factory authorized service center or to the factory for calibration and or services shall be properly prepared for shipping to prevent damage during shipment. In addition, any potentially dangerous residual gases (if applicable) shall be removed from the instrument, and accompanying containers of compressed gases or fluids shall be properly labeled and sealed.

Decontamination procedures should also be documented.

### **6.2.3 Equipment Decontamination**

Equipment media (water quality meters) that comes in contact with site waters must be cleaned **before** transfer between site locations to ensure that cross-contamination does not occur. Decontamination will consist of rinsing the instrument probe with distilled water. It is the responsibility of the field person using the equipment to ensure appropriate cleaning before returning the equipment.

### **6.3 Calculations**

No calculations are anticipated other than those that may be required by the specific instrument calibration manual.

## **7.0 PERSONNEL QUALIFICATIONS**

All field samplers are required to be familiar with H&S plan prior to engaging in any field collection activities. In addition, field personnel should be familiar with the calibration procedures by training and or reading the instruction manual for the instrument and actually performing the calibration procedure.

## **SURFACE WATER FIELD INSTRUMENT CALIBRATION**

### **8.0 HEALTH AND SAFETY**

Some instruments may require use of calibration solutions that may be corrosive, irritant, and/or toxic. Care shall be taken to minimize the potential for injury from the use of such materials by using proper gloves and eye protection, if required.

### **9.0 QUALITY ASSURANCE/QUALITY CONTROL**

The following general quality assurance/quality control (QA/QC) procedures apply:

1. All data must be documented on field data sheets, surface water level data forms, or within personal or site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan.
3. After calibration, all instruments should be tested in normal operating mode by taking a reading in the calibration media and the results recorded.
4. Calibration and verification that instruments are working properly should be carried out prior to entering the field when ever possible and reverified in the field if site conditions warrant by testing the instrument in the proper calibration media.
5. Calibration media should also be checked periodically against a new calibration media and verified not to be expired if they have a certain shelf life.

### **10.0 REFERENCES**

Canadian Standards Association (CSA) (<http://www.csa.ca>) Standard 22.2 No. 157

National Fire Protection Agency (<http://www.nfpa.org/index.html>)

Underwriter's Laboratories, Inc. (<http://www.ul.com/hazloc/define.htm>) Standard UL 913.

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SOP #SW-003  
DATE: 05/06/2019  
REV: 1.0

**STANDARD OPERATING PROCEDURE  
FOR  
SAMPLE MANAGEMENT**

## SAMPLE MANAGEMENT

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## **SAMPLE MANAGEMENT**

### **1.0 SCOPE AND APPLICATION**

The purpose of this Standard Operating Procedure (SOP) is to set guidelines for sample handling, shipping of samples from the field to the laboratory, and documentation of sample shipment using standard chain-of-custody protocols.

Sample handling and shipping also known as sample management is the continuous care given to each sample from the point of collection to receipt at the analytical laboratory. Good sample management ensures that samples are properly recorded, properly labeled, not lost, broken, or exposed to conditions that may affect the sample's integrity.

All sample submissions must be accompanied with a chain-of-custody (COC) document to record sample collection and submission.

The following sections provide the minimum standards for sample management.

### **2.0 METHOD SUMMARY**

Prior to the sampling event, a review of the implementation plan must be conducted to determine what locations are to be sampled, the sequence of sampling, the types of samples that are collected, the preservation methods for each sample type, and the holding time for each sample type.

Sample labels should be created that indicate site location, sample ID, type of analysis requested and appropriate file numbers for the project.

COCs should be created that include laboratory name, address and contact person, and project manager name, project number(s) and address for laboratory invoices.

Arrangements for sample packing materials (coolers and blue ice, as appropriate) and means of conveyance of samples to the lab should be made prior to the sampling event.

## **SAMPLE MANAGEMENT**

### **3.0 INTERFERENCES AND POTENTIAL PROBLEMS**

Potential problems can occur as a result of mislabeling, improper recording of information on forms, effects of water and ice on sample labels and forms. Personnel should re-check sample labels and chain of custody forms both immediately following sample collection and at the end of the day prior to shipment of the samples.

### **4.0 EQUIPMENT**

The following equipment will be required to properly execute this SOP:

- Sample labels
- Chain of Custody forms
- Sampling location list
- Water-proof resealable pouches
- Water-proof ink pens
- Prepared sample containers, labels, markers, ice chests and ice
- Shipping forms and labels
- Field sampling forms and/or logbook

### **5.0 REAGENTS**

Reagents may be utilized for preservation of samples. The preservatives required are specified by the analysis to be performed. Reagents required for sample containers should be provided by the analytical laboratory that will perform the analytical testing.

### **6.0 PROCEDURES**

#### **6.1 *Preparation***

Prior to entering the field area where sampling is to be conducted, the sampler should ensure that all materials necessary to complete the sampling are available.

If samples must be maintained at a specified temperature after collection, proper coolers and ice/cool-packs must be brought out to the field prior to sample collection. Consideration should be given to keeping reserve cooling media on hand if sampling events will be of long duration and ambient temperatures are elevated. Conversely, when sampling in extremely cold weather, proper protection of water samples must be considered.



## **SAMPLE MANAGEMENT**

Personnel performing water-sampling tasks must check the sample preparation and preservation requirements to ensure compliance with the implementation plan. Typical sample preparation may involve pH adjustment (i.e., preservation), sample filtration and preservation, or simply cooling to 6°C. Sample preparation requirements vary from site to site and vary depending upon the analytical method for which the samples will be analyzed.

### **6.2 Procedures**

Samples must be properly labeled as soon as practical after collection.

Note that the data shown on the sample label is the minimum data required. The sample label data requirements are listed below for clarity.

1. Project name
2. Sample number
3. Sampler's initials
4. Date of sample collection
5. Time of sample collection
6. Analysis required
7. Preservatives

The implementation plan should be reviewed to assess any additional requirements.

Quite often the analytical laboratory supplying the containers will provide blank sample labels. If these are adequate and convenient they can be used.

Under certain field conditions, it is impractical to complete and attach sample labels to the container at the point of sample collection. However, to ensure that samples are not confused, a clear notation should be made on the container with a permanent marker indicating the last three digits of the sample number. If the containers are too soiled or small for marking, the container can be put into a plastic resealable bag which can then be labeled.

No one sample number format is adequate for every type of sampling activity. Prior to the start of every project or sub-sampling event within the project, Project Managers and field personnel should devise a sample number format. Sample number formats should be as simple and short as possible. Simple number formats will reduce transcription errors by both samplers and laboratory personnel. The sample number format should be comprehensive enough to allow for easy location of detailed sample data within the Site logbooks. Sample format must also be consistent with any future data management activities.

## **SAMPLE MANAGEMENT**

### **6.2.1 Sample Labels/Sample Identification**

All samples must be labeled with:

- A sample ID (usually the site number)
- Name of the job site, location or client name
- Date and time;
- Parameters to be analyzed;
- Job number; and
- Sampler's initials.

Labels should be secured to the bottle and should be written in indelible inks. It is also desirable to place clear tape over the label before packing in a cooler for label protection during transportation.

### **6.2.2 Packaging**

When possible, sample container preparation and packing for shipment should be completed in a well-organized and clean area, free of any potential cross-contaminants.

Sample containers should be prepared for shipment as follows:

1. Containers should be wiped clean of all debris/water using paper towels;
2. Clear, wide packing tape should be placed over the sample label for protection;
3. All sample containers collected from an individual site should be placed into a common plastic bag and the bag sealed.

While there is no one "best" way to pack samples for shipment, the following packing guidelines should be followed.

1. Plan time to pack your samples (and make delivery to shipper if applicable). Proper packing and manifesting takes time. A day's worth of sampling can be easily wasted due to a few minutes of neglect when packing the samples.
2. Always allow for more coolers and more padding rather than to crowd samples in the shipping containers. The cost associated with the packing and shipment of additional coolers is usually always small in comparison with the cost of having to resample due to breakage during shipment.
3. Do not bulk pack. Each sample must be individually padded.
4. Large glass containers (1-liter and up) require much more space between containers.
5. Ice is not a packing material due to the reduction in volume when it melts.

## **SAMPLE MANAGEMENT**

The following is a list of standard guidelines that must be followed when packing samples for shipment.

1. When using ice for a cooling media, always double bag the ice in plastic resealable bags.
2. Enclose the Chain-of-Custody form in a plastic resealable bag and attach to the inside top of the cooler.
3. Ensure that all stickers/markings and prior address labels have been removed from coolers being used that previously contained such materials.

### **6.2.3 Chain-of-Custody Records**

Chain-of-custody forms will be completed for all samples collected. The form documents the transfer of sample containers.

The chain-of-custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The chain-of-custody document will be signed and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a chain-of-custody form. The chain-of-custody form will consist of one original and two copies which will be distributed as follows: The sampler will retain the one copy while the original and remaining copy will be enclosed in a waterproof envelope within the cooler with the samples. The cooler will then be sealed properly for shipment. The laboratory, upon receiving the samples, will complete the original and remaining copy. The laboratory will retain the copy for their records. The original will be returned with the data deliverables package.

Chain-of-custody (COC) records are legal documents. They must be completed and handled accordingly.

The following list provides guidance for the completion and handling of all COCs.

1. COCs used should be standard forms or those supplied by the analytical laboratory. Do not use any COC forms from other labs, even if the heading is blocked out.
2. COCs must be completed in black ball-point indelible ink only.
3. COCs must be completed neatly using printed text.
4. If a simple mistake is made, line out the error with a single line and initial and date next to it.
5. Each separate sample entry must be sequentially numbered.
6. The use of "Ditto" or quotation marks to indicate repetitive information in columnar entries should be avoided. If numerous repetitive entries must be made in the same column, place a continuous vertical arrow between the first entry and the next different entry.

## **SAMPLE MANAGEMENT**

7. When more than one COC form is used for a single shipment, each form must be consecutively numbered using the "Page \_\_\_ of \_\_\_" format.
8. If necessary, place additional instructions directly onto the COC. Do not enclose separate loose instructions.
9. Include a contact name and phone number on the COC in case there is a problem with the shipment.
10. Do not indicate the source of the sample as this may produce a biased lab result.
11. Before using an acronym on a COC, define clearly the full interpretation of your designation.

### **6.2.4 Shipment**

In all but a few cases, the shipment of samples by other than a laboratory-supplied courier must be an overnight carrier. Prior to the start of the field sampling, the laboratory or shipper should be contacted to determine if pickup could be made at the field site location. If pickup at the field site can be made, the "no-later-than" time for having the shipment ready must be determined.

If no pickup is available at the site, the nearest pickup or drop-off location should be determined. Again, the "no-later-than" time for each location should be determined.

Sufficient time must be allowed not only for packaging but also for delivery of samples if this becomes necessary.

Sample shipments must not be left at unsecured or questionable drop locations (i.e. if the cooler will not fit in a remote drop box do not leave the cooler unattended next to the drop box).

Some overnight carriers do not in fact provide "overnight" shipment to/from some locations. Do not assume; call the carrier in advance before the start of the fieldwork.

Copies of all shipment manifests must be maintained in the field file.

## **7.0 PERSONNEL QUALIFICATIONS**

All field samplers are required to be familiar with H&S plan prior to engaging in any field collection activities. In addition, field personnel should be trained at least one week in the method before initiating the procedure alone.

## **SAMPLE MANAGEMENT**

### **8.0 HEALTH AND SAFETY**

In some instances, samples containers may contain preservatives that if they come in contact with eyes, skin, or ingested can cause bodily injury. Care should be taken (in conformance with the Project Health & Safety Plan to wear the appropriate personal protective equipment (PPE) during sample handling.

### **9.0 QUALITY ASSURANCE/QUALITY CONTROL**

The following general quality assurance/quality control (QA/QC) procedures apply:

1. All data must be documented on field data sheets, monitoring data forms, or within personal or site logbooks.
2. All entries on forms and labels, notations, and/or corrections must be in black ballpoint indelible ink. Any corrections must have a single line through the information being corrected along with the correct information and the person's initials and date.
3. Dates should be recorded in the following format MM/DD/YYYY. Times should be based on a 24-hour military type format for the given time zone (Pacific Standard Time [PST] or Pacific Daylight Time [PDT]). For example, 8:45 am should be recorded as 08:45. The time 2:45 p.m. should be recorded as 14:45.

### **10.0 REFERENCES**

American Chemical Society, 1988. Principles of Environmental Sampling, American Chemical Society Press, Lawrence H. Keith, Editor, 1988.

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**APPENDIX C**  
**FIELD FORMS**

**BISHOP CREEK WATER QUALITY STUDY  
FIELD FORM**

SITE NAME: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

DRAINAGE: Bishop Creek INVESTIGATORS: \_\_\_\_\_

**PHYSICAL WATER QUALITY PARAMETERS**

**WEATHER CONDITIONS**

Water Temperature: \_\_\_\_\_ (°F or °C) Dissolved Oxygen: \_\_\_\_\_ (mg/L)

Conductivity: \_\_\_\_\_ (µmhos/cm@25 °C) Stream or Lake gage reading: \_\_\_\_\_

Turbidity: \_\_\_\_\_ (NTUs) Air Temperature \_\_\_\_\_ (°F or °C) Baro. Pressure \_\_\_\_\_ (in Hg)

Winds \_\_\_\_\_ (mph) Cloud cover \_\_\_\_\_ (%) Precipitation \_\_\_ Fog \_\_\_ Rain \_\_\_ Sleet \_\_\_ Hail \_\_\_ Snow

Secchi Disk: Depth of Disappear: \_\_\_\_\_ meters Depth of Reappearance: \_\_\_\_\_ meters

Secchi Depth: \_\_\_\_\_ meters

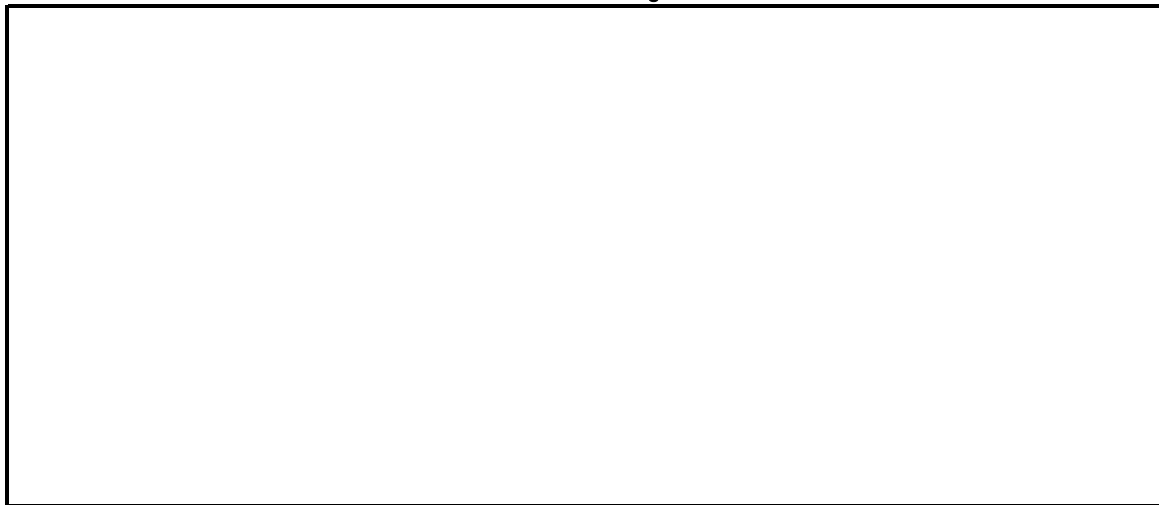
Visual Condition of Stream (check all that apply):

Clear \_\_\_\_\_ Cloudy \_\_\_\_\_ Colored \_\_\_\_\_

Floating Material \_\_\_\_\_ Other: \_\_\_\_\_

Remarks: \_\_\_\_\_

**Site Drawing**



**WATER QUALITY SAMPLE DATA**

Sample No. \_\_\_\_\_ Sample Method: Grab Preservatives: Ice

No. of Sample Bottles \_\_\_\_\_ Preservatives: \_\_\_\_\_

**REMARKS**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SIGNED BY: \_\_\_\_\_ REVIEWED BY: \_\_\_\_\_

## WATER TEMPERATURE AND DISSOLVED OXYGEN LAKE PROFILE DATA FORM

Location: \_\_\_\_\_

DEPTH FROM WATER SURFACE (meters)	WATER TEMPERATURE (°C)	DISSOLVED OXYGEN (mg/L)	DEPTH FROM WATER SURFACE (meters)	WATER TEMPERATURE (°C)	DISSOLVED OXYGEN (mg/L)
0.5			31		
1			32		
2			33		
3			34		
4			35		
5			36		
6			37		
7			38		
8			39		
9			40		
10			41		
11			42		
12			43		
13			44		
14			45		
15			46		
16			47		
17			48		
18			49		
19			50		
20			51		
21			52		
22			53		
23			54		
24			55		
25			56		
26			57		
27			58		
28			59		
29			60		
30			61		





# EXAMPLE

3 Hutton Centre Drive, Suite 200, Santa Ana, CA 92707 (714) 751-7373 FAX (714) 545-8883

## CHAIN OF CUSTODY FORM

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Client Name/Address: PSOMAS 3 HUTTON CENTRE DRIVE, SUITE 200 SANTA ANA, CA 92707			Project/PO Number: 2KLE010101				Analysis Required													
Project Manager: MICHAEL P. DONOVAN			Phone Number: (714) 751-7373				Nitrate-N EPA Method 300.0	Orthophosphate-OPO4 EPA Method 365.3	Total Dissolved Solids SM2540C	Total Kjeldahl Nitrogen by EPA Method 351.2	NO2+NO3 as N - EPA Method 363.2	Total Nitrogen by calculation								Special Instructions
Sampler: Jim Burton, Todd Bear			Fax Number: 714.545.8883																	
Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Time	Preservation														
	water	60 ml Poly	1			None	X													
	water	250 ml Poly	1			None		X											Filtered with 0.45µ	
	water	500 ml Poly	1			None			X											
	water	250 ml Poly	1			H2SO4			X	X	X									
	water	60 ml Poly	1			None	X													
	water	250 ml Poly	1			None		X											Filtered with 0.45µ	
	water	500 ml Poly	1			None			X											
	water	250 ml Poly	1			H2SO4			X	X	X									
	water	60 ml Poly	1			None	X													
	water	250 ml Poly	1			None		X											Filtered with 0.45µ	
	water	500 ml Poly	1			None			X											
	water	250 ml Poly	1			H2SO4			X	X	X									
	water	60 ml Poly	1			None	X													
	water	250 ml Poly	1			None		X											Filtered with 0.45µ	
	water	500 ml Poly	1			None			X											
	water	250 ml Poly	1			H2SO4			X	X	X									
Relinquished By: _____			Date /Time: _____		Received by: _____				Date /Time: _____				Turnaround Time: (Check) Same Day _____ 72 Hours _____ 24 Hours _____ 5 Days _____ 48 Hours _____ Normal <input checked="" type="checkbox"/>							
Relinquished By: _____			Date /Time: _____		Received by: _____				Date /Time: _____				Sample Integrity: (Check) Intact _____ On Ice _____							
Relinquished By: _____			Date /Time: _____		Received in Lab by: _____				Date /Time: _____											