REC 1 FLOW INFORMATION FEASIBILITY STUDY

1.0 EXECUTIVE SUMMARY

In 2003, consultation with recreation specialists was completed to identify specific stream reaches within the ALP (Alternative Licensing Process) study area with potential whitewater opportunities.

Five stream reaches with potential whitewater opportunities were identified for which real-time flow information could possibly be beneficial to whitewater recreationalists, including Florence Lake Run and Mount Tom Run on the South Fork San Joaquin River (SFSJR), Tied-For-First Run and Chawanakee Gorge Run on the San Joaquin River (SJR), and Upper Mono Run on Mono Creek.

Gaging stations that adequately measure flow conditions currently exist for all the target stream reaches. SCE obtains flow information from these gages by radio telemetry on 15-minute intervals, and from data cards that are downloaded monthly. Currently, flow data is reviewed by Southern California Edison (SCE) and annually submitted to the United Stated Geological Survey (USGS), who also reviews the data, before it is posted and made available to the public. However, the review and posting process is time intensive and the data is typically not posted until after the end of the water year.

Provisional flow data and spill information might be provided in a timelier manner to the public on an Internet Website. Potential problems associated with providing this data include the practical resolution of technical and reliability problems, and limitations on the accuracy of the data. This study plan is designed to explore the feasibility of providing such information.

2.0 STUDY OBJECTIVES

Determine the feasibility of providing real-time flow data on appropriate reaches for whitewater boating.

3.0 STUDY IMPLEMENTATION

3.1 STUDY ELEMENTS COMPLETED

- Identified stream reaches with potential whitewater boating opportunities in consultation with various whitewater specialists.

- Identified specific target stream reaches for which real-time flow information could potentially be beneficial to the whitewater recreation community.

- Identified existing gaging stations and associated monitoring, recording, and telemetry equipment.

- Identified reaches where additional gaging stations could potentially provide beneficial flow data for whitewater boating.

- Identified available streamflow data collection and equipment options to relay real-time flow data.

- Identified options for data dissemination mechanisms.

- Gathered historical streamflow data.

3.2 OUTSTANDING STUDY ELEMENT

- None.

4.0 STUDY METHODOLOGY

Stream reaches with potential whitewater boating opportunities were identified in consultation with whitewater recreation specialists, including representatives from the United States Forest Service (USDA-FS), San Joaquin Paddlers, American Whitewater Affiliation, Friends of the River, and other interested persons with whitewater boating experience in the study area, in coordination with the REC 3, Whitewater Recreation Assessment Study (SCE 2004). During consultation, the reaches on which real-time flow information could potentially be beneficial for whitewater users were identified.

The locations of existing gaging stations that monitor the flow for the target stream reaches were identified in the Big Creek ALP Geographic Information System (GIS) database and mapped.

The existing infrastructure at each gaging station was evaluated to determine if any improvements would be needed to provide real-time flow information to the public. If current equipment was found to be incompatible with these requirements, potential options to record and disseminate real-time flow information were identified and evaluated.

Historical streamflow data on the potential whitewater stream reaches was compiled and analyzed in the REC 3, Whitewater Recreation Assessment Study (SCE 2004).

5.0 STUDY RESULTS AND ANALYSIS

5.1 IDENTIFICATION OF WHITEWATER OPPORTUNITY REACHES

Initially, five stream reaches were identified for whitewater recreation on which flow information would be beneficial. The boating community also expressed an interest in feasibility of providing flow information that would enable an estimate of flow in unimpaired reaches that drain into the Big Creek Basin (North Fork San Joaquin River and the South Fork San Joaquin River above Florence Lake). A brief description of

each of the five whitewater reaches and the two unimpaired reaches is provided below. Figures REC 1-1a through 1-1e depict the target stream reaches.

Bypassed Reaches:

South Fork San Joaquin River (Florence Lake Run)

- A 6.5 mile section along the SFSJR from the Jackass Meadow Campground to the Mono Hot Springs Campground.

South Fork San Joaquin River Mount Tom Run (Mount Tom Run)

- A 11.3 mile reach along the SFSJR from Mono Hot Springs to an undeveloped trail which leads to the Mount Tom Heliport (or Rattlesnake Crossing bridge).

San Joaquin River (Tied-For-First Run) (Mammoth Pool Dam to Dam 6 Forebay)

- A 8.5 mile run along the SJR between Mammoth Pool Dam and Mammoth Pool Powerhouse at Dam 6 Forebay.

San Joaquin River (Chawanakee Gorge Run) (San Joaquin River Dam 6 – Redinger Lake)

- A 8.3 mile section along the SJR from the base of Dam 6 downstream of the Mammoth Pool Powerhouse to the Italian Bar Bridge at the upstream end of Redinger Lake

Mono Creek (Upper Mono Run)

- A 2.5 mile section along Mono Creek below Vermilion Valley Dam to the Mono Diversion at the USDA-FS Mono Creek Campground.

Unimpaired Reaches:

San Joaquin River

- The San Joaquin River upstream of Mammoth Pool Reservoir.

South Fork San Joaquin River

- South Fork San Joaquin River Upstream of Florence Lake.

5.2 MONITORING AND RECORDING FLOW

SCE operates seven gaging stations that measure flow in association with the target stream reaches along the SFSJR, SJR, and Mono Creek in the Big Creek ALP. For each of the target stream reaches, a description of the associated gages, their locations, equipment specifications, and data collection interval is summarized in the following. Figures REC 1-1a through 1-1e depict the target stream reaches with the

locations of these gages. Detailed fact sheets that describe each gaging station are provided in Appendix A. The telemetry equipment installed at the gaging stations notifies SCE remotely and automatically of water levels measured at these points which is translated into flows, typically in units of cubic feet per second (cfs). The gage stations discussed in this report are equipped with dataloggers that collect and record gage height measurements every 15-minutes. Gage height data is recorded on data cards within the dataloggers which are collected and downloaded monthly. The data card data provides a longer term record which is reviewed for quality assurance /quality control (QA/QC) by SCE hydrographers and then released to the USGS. In addition, the gages discussed in this report are equipped with a communication system that utilizes telemetry equipment to transmit the gage height data to the northern hydro operations control center located at the Big Creek No. 3 powerhouse. The telemetry data provides information to ensure compliance with minimum instream flow release requirements. Redundant data collection (data card and telemetry) is conducted to avoid data loss should either one of the systems fail. Data loss can occur as result of data card failure (battery power loss), equipment failure (logger or gage sensor), power system failure (solar array), lightning, falling trees, or vandalism.

The gage station communication systems consist of a power source and a radio. Power at each of the gage locations is provided by either an AC power connection from a nearby power source (i.e. fish water generator) or from a battery array that is recharged by a solar panel. Appendix A provides information describing the equipment at each gage including telemetry equipment and power supply.

Streamflow measurements are collected every 15 minutes and relayed by telemetry to the northern hydro operations control center located at the Big Creek No. 3 powerhouse. The 15-minute stream gage readings are also recorded on an electronic data card, which is downloaded monthly

The records from the gages are reviewed and checked for accuracy annually by SCE. The data is then sent electronically to the USGS, which also assigns its own stream gage numbers to the gages. Following review and acceptance, the flow data is then published by the USGS. The gages are currently operational, SCE will continue to be responsible for operating and maintaining the gages for the Big Creek ALP.

Calibration of the gaging station equipment is performed on a monthly basis by SCE by comparing the installed recorder readings to a staff gage permanently installed at the gage to identify any potential discrepancies. The USGS also conducts biannual inspections to verify the calibration of the rating curves for each gaging station for which records it is responsible for reviewing and publishing.

SFSJR (Florence Lake Run)

Flow within the Florence Lake Run, SFSJR, is the cumulative sum of flows from the SFSJR, Hooper Creek and Bear Creek, as well as other smaller tributaries. The SFSJR below Hooper Diversion, USGS Gage No. 11230215 (SCE Gage No. 129) and Bear Creek below Diversion Dam, USGS Gage No. 11230530 (SCE Gage No. 175-A)

measure the majority of the flow within the reach, and are described below. The Hooper Creek Gauge provides the primary information about flows in this reach. Flow input from Bear Creek can be significant during the spring run off and is therefore included in the flow calculation for this reach. However, as smaller tributaries and ephemeral channels also contribute flow into the SFSJR within the reach, these measurements are estimates, particularly during runoff periods.

SFSJR below Hooper Diversion, USGS Gage No. 11230215 (SCE Gage No. 129)

The SFSJR below Hooper Diversion gaging station, USGS Gage No. 11230215 (SCE Gage No. 129), located on the SFSJR downstream of the Hooper Creek confluence provides the flow data for the SFSJR flowing from Florence Lake and from Hooper Creek. This gage is at an altitude of 6,949 feet and is located at Latitude (Lat.) 37° 18' 30" N, Longitude (Long.) 118° 57' 40", in NE ¼ Section (Sec.) 24, Township (T) 7S, Range (R) 27E, Mt. Diablo Meridian. Flow at this gaging station is recorded using a Stevens A-35 recorder and Stevens A/F data logger.

Bear Creek below Diversion Dam, USGS Gage No. 11230530 (SCE Gage No. 175-A)

Bear Creek joins the SFSJR approximately 5 miles downstream of the put-in at Jackass Meadow. The gage is located immediately below the Bear Creek Diversion Dam measuring minimum instream releases and spills. The gage is at an altitude of 7,350 feet and is located at Lat. 37° 20' 10", Long. 118° 58' 20", in the SW ¼ Sec. 12, T 7S, R 27E, Mt. Diablo Meridian. Flow is measured using a Design Analysis H-350/H-355 Bubble System in tandem with a Stevens Multi-Logger with an analog board.

SFSJR (Mount Tom Run)

Flow within the Mount Tom Run, SFSJR, is the cumulative sum of inputs from the SFSJR and Bear Creek above the put-in at Mono Crossing, as well as Mono Creek and numerous smaller tributaries downstream of the put-in. The flows are measured upstream of Mono Crossing at the SFSJR below Hooper Creek, USGS Gage No. 11230215 (SCE Gage No. 129) and Bear Creek below Diversion Dam, USGS Gage No. 11230530 (SCE Gage No. 175-A). The flow from Mono Creek, which joins the SFSJR approximately 3.6 miles upstream of the take-out, is measured at Mono Creek below Diversion Dam, USGS Gage No. 11231550 (SCE Gage No. 118). The Hooper Creek Gauge provides the primary information about flows in this reach. Flow input from Bear Creek and Mono Creek can be significant during the spring run off and are therefore included in the flow calculation for this reach. However, as smaller tributaries and ephemeral channels also contribute flow into the SFSJR within the reach, these measurements are estimates, particularly during runoff periods.

SFSJR below Hooper Diversion, USGS Gage No. 11230215 (SCE Gage No. 129) and Bear Creek below Diversion Dam, USGS Gage No. 11230530 (SCE Gage No. 175-A)

The equipment specifications of the gaging stations on the SFSJR below Hooper Creek and on Bear Creek below Diversion Dam are described above in the descriptions of the Florence Lake Run gaging stations.

Mono Creek below Diversion Dam, USGS Gage No. 11231550 (SCE Gage No. 118)

The Mono Creek below Diversion Dam gaging station measures flow, including instream flow releases and spills, from Mono Diversion Dam. The gage is at an altitude of 7,350 feet and is located at Lat. 37° 21' 30, Long. 118° 59' 50", in the SE ¼ Sec. 34, T. 6S, R 27E, Mt. Diablo Meridian. Flow at this gaging station is recorded using a Stevens A-35 recorder with an attached Shaft Encoder/Float Tape System connected to a Stevens Multi-Logger.

SJR (Tied-For-First)

Flow within the Tied-For-First, SJR, reach is measured at the SJR above Shakeflat Creek, USGS Gage No. 11234760 (SCE Gage No. 157), which is described below. Smaller, ungaged tributaries also contribute flow into the SJR within this reach. Consequently, the flow measurements for the reach are estimates, particularly during runoff periods.

SJR above Shakeflat Creek, USGS Gage No. 11234760 (SCE Gage No. 157)

This gage measures the flow within this reach of the SJR and is located approximately 0.8 miles downstream of the put-in. The gage is at an altitude of 2,870 feet and is located at Lat. 37° 19' 00" N, Long. 119° 19' 37", in SW ¼ Sec. 14, T 7S. R 24E, Mt. Diablo Meridian. Flow at this gaging station is monitored and recorded with a Design Analysis H-350/H-355.

SJR, Chawanakee Gorge Run

Flow within the Chawanakee Gorge reach, SJR, is the cumulative sum of inputs from the SJR and Stevenson Creek, as well as smaller tributaries. Flow within the Chawanakee Gorge reach of the SJR is measured at the SJR above Stevenson Creek, USGS Gage No. 11238600 (SCE Gage No. 124-S). Flow from Stevenson Creek, which flows into the SJR approximately 4.5 miles downstream from the put-in, is measured at Stevenson Creek at Shaver Lake, USGS Gage No. 11241500 (SCE Gage No. 131). Flow contributions from the smaller streams and ephemeral streams are not gaged. The flow in this reach is the cumulative sum of the stream gage readings at the SJR above Stevenson Creek and in Stevenson Creek below Shaver Lake.

SJR above Stevenson Creek, USGS Gage No. 11238600 (SCE Gage No. 124-S)

This gage measures the flows that spill over Dam 6. The gage is at an altitude of 2,307 feet and is located at Lat. 37° 12' N, Long. 119° 20'W, in SW ¼ Sec. 27, T 8S, R. 24E,

Mt. Diablo Meridian. Flow at this gaging station is recorded using a float operated gage attached to a data logger.

Stevenson Creek at Shaver Lake, USGS Gage No. 11241500 (SCE Gage No. 131)

This gage is located approximately 0.25 miles downstream of Shaver Lake and 3.9 miles upstream of the SJR confluence. This gage is at an altitude of 5,120 feet and is located at Lat. 37°08'41", Long. 119°18'27" in SW ¼ Sec. 13, T. 9S, R. 24E, Mt. Diablo Meridian. The gage measures leakage and release from Shaver Dam and limited local runoff from rains and snowmelt. Flow at this gaging station is recorded using a float operated gage attached to a data logger.

Mono Creek, Upper Mono Creek Run

The gaging station below Lake Thomas Edison, USGS Gage No. 11231500 (SCE Gage No. 119) provides the flow data needed to describe the flows within the Upper Mono Creek Run reach. Additional flow inputs from small tributaries and ephemeral streams may occur, particularly during runoff periods. Consequently, flows measured at the Lake Thomas Edison gage are approximate for the flows within the reach.

Mono Creek below Lake Thomas Edison, USGS Gage No. 11231500 (SCE Gage No. 119)

This gage provides the flow data to measure the spill and release from Lake T.A. Edison. This gage is at an altitude of 7,400 feet and is located at Lat. 37° 21' 40", Long. 118° 59' 26", in SW ¼ Sec. 35, T 6S, R 27E, on the left bank 0.6 miles upstream from the Mono Diversion Dam. Flow at this gaging station is recorded using a Stevens A-35 recorder with 10" Chart and Stevens A/F data logger via a Shaft Encoder.

San Joaquin River above Mammoth Pool Reservoir

There are no existing stream gages located along the San Joaquin River (SJR) because SCE does not affect the flows from the North or Middle forks SJR upstream of Mammoth Pool Reservoir. Therefore it is not feasible with the existing infrastructure to report real-time flows along the SJR. New stream gages would need to be installed in order to report real-time stream flow in the SJR. However, on-river locations upstream of Mammoth Pool Reservoir are located within the designated Ansel Adams Wilderness Area and current Wilderness Area regulations would prohibit the installation of a new stream gage and associated infrastructure.

SCE does estimate average daily inflows into the reservoirs from upstream unimpaired reaches based on reservoir elevation stage changes and generation throughput as part of the operation and maintenance of the Project. However, this information is considered proprietary and may not be released by SCE onto a publicly accessible Website.

South Fork San Joaquin River above Florence Reservoir

There are no existing stream gages located in the SFSJ River above Florence Lake because SCE does not affect these flows and it is not feasible with the existing infrastructure to report real-time flows along this reach. New stream gages would needed to be installed in order to report real-time stream flow measurements from this reach. However, on-river locations upstream of Florence Lake are within the designated John Muir Wilderness Area and current Wilderness Area regulations would prohibit the installation a new stream gage and associated infrastructure.

SCE does estimate average daily inflows into the reservoirs from upstream unimpaired reaches based on reservoir elevation stage changes and generation throughput as part of the operation and maintenance of the Project. However, this information is considered proprietary and may not be released by SCE onto a publicly accessible Website.

5.3 DISSEMINATION OF STREAMFLOW DATA

Currently, the data collected by SCE from the stream gages is reviewed by SCE hydrographers as part of its QA/QC protocol. Upon completion of the QA/QC process, the data is catalogued and made available to the USGS in annual hydrology summary reports. The USGS then completes their QA/QC review of the data, and subsequently publishes the data and posts it within their electronic database that can be accessed via the Internet at http://waterdata.usgs.gov/nwis/.

SCE follows the requirements for furnished records quality assurances as outlined in the October 25, 1999 letter from the USGS to FERC cooperators during the collection and reporting of flow data (refer to Appendix B for a copy of the October 25, 1999 letter).

The reviewed flow information from the target stream reaches could be posted and made available to the public on the SCE Big Creek Internet Website (http://www.sce.com/bigcreek). However, this data would not have gone through the quality assurance process. In addition, whitewater flow release dates, updates to the release schedule, and notices that relate to instream flow could be posted. Scheduled releases could be forecasted by April 15, but these flows would likely be updated with any modifications in the schedule as SCE operations change.

SCE is currently evaluating options of providing real-time flow information to the public as part of the Flow Monitoring Plan for Big Creek No. 4 Hydroelectric Project (FERC No. 2017). Specifically, SCE proposed to provide flow information in a timely manner to the resource agencies on an Internet Website**.**

Historical streamflow data and statistics for the reaches with existing USGS gaging stations are available at http://waterdata.usgs.gov/nwis/. Additional historical streamflow analyses and recreation information for selected whitewater reaches, including Florence Lake Run, Tied-for-First Run, Chawanakee Gorge Run, and Upper

Mono Run, are available in REC 3, Whitewater Recreation Assessment Study, (SCE 2004).

6.0 LITERATURE CITED

Southern California Edison (SCE). 2004. 2003 Final Technical Study Reports (First Distribution) for the Big Creek Hydroelectric System Alternative Licensing Process. REC 3, Whitewater Recreation Assessment Study. August 2004.

FIGURES

Placeholder for Figures

Non-Internet Public Information

These Figures have been removed in accordance with the Commission regulations at 18 CFR Section 388.112.

These Figures are considered Non-Internet Public information and should not be posted on the Internet. This information is provided in Volume 4 of the Application for New License and is identified as "Non-Internet Public" information. This information may be accessed from the FERC's Public Reference Room, but is not expected to be posted on the Commission's electronic library, except as an indexed item.

APPENDIX A

Gaging Stations Descriptions

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: South Fork San Joaquin River below Hooper Creek near Florence Lake

SCE Company's Number: 129 **USGS Number:** 11-2302.15

Station Record: October 24, 1946 to present

Location: **Lat.** 37° 18' 30" N **Long.** 118° 57' 40"
In Northeast ¼ Section 24, Township 7S, Range 27E, Mt. Diablo Meridian

Altitude: 6,949'

Drainage area: 177 Square miles

Recorder: Stevens A-35 recorder and Stevens A/F data logger with a NetCom Radio providing telemetry.

Gages:

- **Outside Gages**: Baked enamel steel plate located on downstream side of gaging station, 0.00 feet to 9.20 feet. Section from 0.00 feet to 3.30 feet currently missing.
- **Well Gages:** Baked enamel steel plate located inside stilling well, from 0.0 feet to 6.73 feet.
- **Tape gage:** Graduated stainless steel float tape on A-35 recorder.

Shelter and Well: 36" CMP pipe serves as stilling well and supports wooden walk-in recorder shelter.

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: Bear Creek below Diversion Dam (Release / Spill)

SCE Company's Number: 175-A **USGS Number:** 11-2305.30

Station Record: Surface Water Discharge. **On file**: 1928 to current data; Station 175-A in Service 09/18/1990.

Location: Lat. 37° 20', 10", Long. 118° 58' 20", in the SW ¼ Section 12, Township 7 S, Range 27 E, Mt. Diablo Meridian (Mt. Abbot Quad.).

Altitude: 7,350 Feet. **Drainage Area:** 52.8 square miles.

Recorder: H-350 / H-355 Bubblier System in tandem with a Stevens Multi-Logger via 4-20 ma output. Recorder located above spill crestway with orifice nitro line leading to the Parshall Flume and Dam Spillway. 175-A records minimum release flows through Parshall Flume and can record stage over spill crest.

Communications: A Type II Netcom Radio linked to the Multi-Logger. Four 100 AH Marine Batteries, which are charged by 5-55 watt solar panels, power the radio system and electronics.

Gages:

- **Outside Gages:** Spillway staff located near diversion intake – 2.00 to 19.00 GHT. Minimum Release/Spill Staff located in entrance Section of Parshall Flume 0.00 to 0.94'.
- **Well Gages:**

Shelter and Well: Location shared with Station 102 / Station 175-S in large walk-in recorder house at right bank of dam crest. It is adjacent to diversion intake.

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: Mono Creek below Diversion Dam

SCE Company's Number: 118 **USGS Number:** 11-2315.50

Station Record: Surface Water Discharge.

Location: Lat. 37° 21' 30", Long. 118° 59' 50", in the SE ¼ Section 34, T.6S, R 27 E., Mt. Diablo Meridian, Abbot 15' quad map.

Altitude: 7,350 feet **Drainage Area:** 92.7 square miles

Recorder: Stevens A-35 Chart Recorder with attached Shaft Encoder / Float Tape System connected to a Stevens Multi-Logger.

Communications: A Type 1 Netcom Radio Transceiver System interrogated by BC-3 and the Hydrographic Department.

Gages: Stainless Steel Tape on Spill.

- Outside Gages: **Baked Enamel Type mounted on the east side of the Gage** Well, Range – 3.33 to 20.34 GHT.
- Well Gages: **Range 3.33 to 19.65 GHT on west side of Well.**

Shelter and Well: A 3' x 4' Concrete Structure built into the Intake Structure. Elevations: Top of Shelter – 7370.36 (34.0 GHT), Instrument Shelf – 7365.36 (29.0 GHT), Well Bottom – 7336.36 (0.00 GHT).

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: San Joaquin River below Shakeflat Creek

SCE Company's Number: 157 **USGS Number:** 11-2347.60

Station Record: January 5th, 1960 to present

Location : **Lat.** 37° 19' 00" N **Long.** 119° 19' 37"
In Southwest ¼ Section 14, Township 7S, Range 24E, Mt. Diablo Meridian

Altitude: 2,870'

Drainage area: 1,003 Square miles

Recorder: A Design Analysis H-350 / H-355 monitor and record the stage. The data logger is hooked to a NetCom Radio that provides telemetry to the hydrographic office in Big Creek. A solar panel provides power to a battery array that powers the entire system.

Gages:

- **Outside Gages:** Baked enamel steel plate in two separate sections, lower section is attached to upstream remains of old gage well. Upper section is cantilevered off rocks.
- **Tape gage:** N/A

Shelter and Well: The station shelter is a 5'X 5' walk-in steel building.

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: San Joaquin River above Stevenson Creek

SCE Company's Number: 124-S **USGS Number:** 11-2386.00

Station Record: Appears to have started approximately 12/13/56 and continued until 1974. This Station records Spill over the Dam.

Location: Lat. 37° 12' N, Long. 119° 20' W, ¼ Sec. 27, T8 S, R24 E, Mt. Diablo, Mt. Diablo Meridian. Garmin GPS Elevation is 2,307 feet.

Recorder:

Low Flow: An Acoustical Velocity Meter with sensors mounted in a lab tested spool piece. A Stevens 4-20mA Data Logger records the Data.

High Flow: A Stevens Selsyn sends a signal to Big Creek #3. Attached to the Selsyn is a Stevens AF Data Logger. This records Spill over the Dam.

Gages:

- **Outside Gages:** 2300.00 to 2346.66
- **Well Gages:** None.

Shelter and Well: A metal shack located next to the Intake Grids on top of the Intake Structure.

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: Stevenson Creek at Shaver Lake

SCE Company's Number: 131 **USGS Number:** 11-2415.00

Station Record: Surface Water Discharge.

Location: Latitude 37°08'41", Longitude 119°18'27", in the SW ¼ Section 13, Township 9 S, Range 24 E, Mt. Diablo Meridian
The Station is located about one-quarter mile below Shaver Dam and several hundred yards downstream of Highway 168.

Altitude: 5,120 feet **Drainage Area:** 29.4 square miles

Recorder: Stevens A\F Data Logger attached to a float operated Stevens A-35 Chart Recorder driven by a Quartz Clock.

Communications: The Data Logger is connected to a NetCom Radio that provides telemetry to the Hydrographic Office in Big Creek. Station Power is provided by AC power with battery backup.

SOUTHERN CALIFORNIA EDISON COMPANY

GAGING STATION DESCRIPTION SUMMARY

Station Name: Mono Creek below Lake T. A. Edison

SCE Company's Number: 119 **USGS Number:** 11-2315.00

Station Record: October 1921, to current year.

Location: Lat. 37° 21' 40" Long. 118° 59' 26" in SW ¼ Sec. 35, T 6 S, R 27 E, on left bank 0.6 miles upstream from Mono Diversion Dam. One mile downstream from Lake T. A. Edison and 1.9 miles NE of Mono Hot Springs.

Altitude: 7,400' **Drainage Area:** 92.5 sq. mi.

Recorder: A Stevens A-35 Recorder with 10" Chart. Data is logged by a Stevens A/F Logger via a Shaft Encoder. The Stevens A-35 Recorder Chart is powered by a Stevens Quartz Multi-Timer.

Gages: Tape gage part of Recorder

- **Outside Gages:** One section. Limits: 3.3 to 10.0 on stream side (east) of the gage well.
- **Well Gages:** One section. Limits: same as above.

Communications: A Type 1 Netcom Radio is interrogated by BC3 and the Hydrographic Department at 15-minute intervals.

Shelter and Well: Concrete. Overall height = 21.5 ft. Elevation of bottom of Well = 1.9 ft.; top of instrument shelf = 17.7 ft.; top of house walls = 21.9 ft. No clean out door.

APPENDIX B

FURNISHED RECORDS QUALITY ASSURANCE REQUIREMENTS LETTER

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Division
California District
Office of the District Chief
6000 J Street
Placer Hall, Suite 2012
Sacramento, California 95819-6129
Phone: 916/278-3026 Fax: 916/278-3045
http://water.wr.usgs.gov

October 25, 1999

Dear Colleague:

The United States Geological Survey (USGS) routinely reviews the streamgaging activities of each USGS district in order to ensure uniform quality and adherence to USGS standards. The 1999 review of the California District revealed some deficiencies requiring improvement. The most frequently occurring, concerned records furnished to the California District by non-USGS entities. The review concluded, and demonstrated, that some streamflow records furnished to the California District were not collected or computed to the same standards as USGS records or that they lacked required documentation of the data-collection process. USGS policy requires that furnished records be collected and computed to the same standards as records that are collected by the USGS. In the future, the California District will more vigilantly enforce USGS standards as a condition of accepting furnished data.

USGS Standards for Furnished Records

USGS Open-File Report 96-618, Surface Water Quality Assurance Plan for the California District of the U.S. Geological Survey (copy enclosed), summarizes and builds upon required data collection and computation techniques, practices, and policies described in applicable USGS Techniques of Water Resources Investigations (TWRI's), other USGS published documents, and USGS Technical memoranda. Taken together, these documents, each addressing different streamgaging activities, constitute "USGS standards". A list of applicable USGS TWRI's is enclosed. These documents and USGS Water Supply Paper 2175, Measurement and Computation of Streamflow (Volumes 1 and 2), are available by order from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Federal Center
Denver Colorado 80225
(303) 202-4700

Dear Colleague:

Relevant technical memoranda are posted on the Internet at:

http://water.usgs.gov/osw/pubs.html

Additional copies of OFR 96-618 may be obtained at:
http://water.wr.usgs.gov/cal.dist/pp/qa.html

OFR 96-618 provides specific guidance for implementing USGS standards in California. It lists materials that should be provided for review including:

- Daily values table
- Hydrograph of daily discharges
- List of discharge measurements
- Copies of discharge measurements
- Primary computation sheets (hourly gage-heights, shifts, datum corrections)
- Copy of any graphic record used for computation
- New rating tables and new rating curves
- Station analysis (explaining how and why of rating changes, shifts, and datum corrections)

Beginning in WY 1999, this list is amended to include the following:

- A copy of the latest gaging station levels; and,
- An updated station description showing:
  -the surveyed elevation of at least three reference marks; and,
  -a revised "Discharge measurements" section containing the information described below.

Maintenance of Discharge Ratings

There are many methods of collecting high-quality streamflow data. Most of these methods involve development and maintenance of discharge ratings, instrument ratings, or both. Development and maintenance of ratings is one of the more challenging aspects of streamgaging. For natural channels, stage-discharge ratings are usually defined by current-meter measurements of a sufficient quantity to define the ratings, and their changes and shifts throughout the full range of interest. Measurements generally are made once a month or more frequently when there is a significant change in channel conditions. Ratings are then adjusted in accordance with the measurement data.

Properly calibrated and maintained weirs, flumes, or gates (engineered structures), ultrasonic-velocity meters (UVM), Doppler instruments, and dye-dilution techniques may be used to collect streamflow records. However, use of these techniques requires skilled application and periodic verification or recalibration of instruments and ratings. Plans for using these methods should be discussed with the USGS field office that will review

Dear Colleague:

the data and they should be described under the "Discharge measurements" section of the station description. These plans will differ depending on gaging conditions.

Artificial controls are used to improve rating sensitivity and stability. For control structures in open channels such as weirs and flumes, theoretical or manufacturer ratings should be checked by a minimum of two discharge measurements each year (one each on the high-and low-end of the rating) or as needed to define shifting conditions. However, this minimum number of measurements can only be supported under the ideal conditions for which the structure was designed. The presence of debris or aquatic growth, worn or damaged wetted surfaces, changed or unstable approach conditions, or the settling or heave of the gaging structure will necessitate increased monitoring and measurement. Provisions to maintain the applicability of the rating by periodically inspecting and cleaning the structure, repairing and replacing worn or damaged parts, and ensuring correct positioning (through level surveys and adjustment) will be required and should be described in the "Discharge measurement" section of the station description. Changes in stage or hydraulic head following these activities should be recorded and may be used to apply shifts to established ratings.

Discharge ratings developed for well-maintained turbines and penstocks are usually very stable and very accurate. However, worn or damaged meters, orifices, valves, and piping or obstructed passages may result in significant rating changes. The planned technique for ensuring the accuracy of turbine and penstocks ratings, and the frequency of its application, should be described in the "Discharge measurements" section of the station description. Where possible, such ratings should be checked periodically by independent data such as current-meter measurements or UVM's. Generally, UVM ratings are stable and accurate, but periodically they should be verified by an independent means such as by use of temporary clamp-on UVM's or current meter measurements or against independently developed turbine ratings. UVM instrumentation should be monitored for signal strength and inspected for system wear or damage. Plans for quality assuring UVM data should be described in the "Discharge measurements" section of the station description.

Annual Review of Furnished Records

The annual review of furnished records performed by USGS personnel is designed to ensure that furnished records are collected in accordance to USGS standards. It also provides a mechanism for identifying opportunities for improvement. During the review and during visits to streamgaging facilities, USGS personnel will point out areas needing improvement. Cooperators may consult USGS staff as they endeavor to make these improvements. For records provided to the USGS as a condition of an FERC license, the USGS will report unresolved deficiencies to the FERC for follow-up action.

Dear Colleague

As in past years, the deadline for submitting records for USGS review will be December 31, 1999 in order for USGS personnel to perform the work and meet the deadlines required of the USGS.

To facilitate an understanding of USGS standards, the California District recently presented a weeklong overview of USGS field techniques to non-USGS hydrographers. A follow-up course is planned for spring 2000. Persons interested in attending should contact Paul Hayes, FERC Coordinator, at (916) 381-0207, ext. 315. An interactive course has also been created and posted on the Internet at:

http://wwwrcamnl.wr.usgs.gov/sws/fieldmethods/

If there are any questions or problems pertaining to this letter or USGS standards, please do not hesitate to write Mr. Hayes at the above address or to call him at the number listed above.

Sincerely,

Michael V. Shulters

Michael V. Shulters
Chief, California District

3-A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS–TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS–TWRI Book 3, Chapter A10. 1984. 59 pages.

3-A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS–TWRI Book 3, Chapter A13. 1983. 53 pages.

3-A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS–TWRI Book 3, Chapter A14. 1983. 46 pages.

3-A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS–TWRI Book 3, Chapter A16. 1985. 52 pages.

3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS–TWRI Book 3, Chapter A17. 1985. 38 pages.

3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS–TWRI Book 3, Chapter A19. 1990. 31 pages.