

APPENDIX A.3

Hydropower Team Trip Report

(June 18-20, 2003)

UPPER SAN JOAQUIN RIVER BASIN STORAGE INVESTIGATION - PHASE 1

HYDROPOWER ANALYSIS TRIP REPORT - SITE VISITS TO RETAINED SITES

June 18 – 20, 2003

INTRODUCTION

This field trip report was prepared to document on-site data collection activities in support of an appraisal-level hydropower evaluation of surface storage options under consideration in the Phase 1 Upper San Joaquin River Basin Storage Investigation. As part of Task 1, Data Collection, field trips were made to three potential Temperance Flat dam locations on the San Joaquin River at river mile (RM) 274, RM 279, RM 286; and at two potential dam sites for off-stream storage reservoirs at Fine Gold Creek and Yokohl Creek. Field trips were also made to the Pacific Gas and Electric (PG&E) and Southern California Edison (SCE) hydroelectric facilities likely to be impacted by dams at RM 274, RM 279 and RM 286. The PG&E facilities included Wishon Powerhouse, Kerckhoff Dam, Kerckhoff No: 1 Powerhouse and Kerckhoff No: 2 Powerhouse. The SCE facilities included Big Creek No: 4 Powerhouse, Redinger Dam and Big Creek No: 3 Powerhouse. The PG&E and SCE facilities are all located on the San Joaquin River.

Potential dam locations and existing PG&E and SCE facilities were visited as follows:

Wednesday, June 18, 2003: RM 286, Big Creek No: 4 Powerhouse, Redinger Dam, Big Creek No: 3 Powerhouse, and Fine Gold Creek.

Thursday, June 19, 2003: Kerckhoff Dam, Wishon Powerhouse, Kerckhoff No: 1 Powerhouse, Kerckhoff No: 2 Powerhouse, and Yokohl Creek.

Friday, June 20, 2003: Millerton Lake, RM 274, Fine Gold, and RM 279.

The core field trip team consisted of the following MWH members of staff:

Foster Pelton, Civil Engineer

James M. Herbert, Engineering Geologist

Jill N. Miller, Civil Engineer

The field trip on Wednesday, June 18 was made in conjunction with the MWH team of environmental specialists. On Thursday, June 19, a representative of PG&E accompanied the core field trip team. On Friday, June 20, sites were viewed by boat on Lake Millerton where the core field trip team was part of a larger Bureau of Reclamation and MWH group.

The field trip team stayed each night in the town of Clovis just northeast of Fresno. The team assembled in Clovis on the evening of Tuesday, June 17.

Details of the field trips are given below for each day. Photographs are given in the Appendix in the order the sites were visited.

FIELD TRIP – WEDNESDAY, JUNE 18

The route to the RM 286 Dam Location from Clovis was northeast on Route 168 to the town of Prater. About a mile after Prater, a left turn was made onto Auberry Road and this was followed to the town of Auberry. From Auberry, the group continued north on Powerhouse Road and then west on Smalley Road to a viewpoint of the RM 286 dam location. Arrangements had been made by the Bureau of Reclamation for the gates on the final section of access to the viewpoint to be unlocked.

RM 286 Dam Location

The proposed site of the dam at RM 286 was seen from the high viewpoint off Smalley Road. Time did not permit actually visiting the site, which would have required hiking in from an upstream access.

Two adits exist in the area. One of these was viewed and comprised a short unlined portion leading to a concrete plug in which a steel man-way was contained. The adit was approximately 20 feet in diameter and the concrete plug was about 60 feet into the hillside. Examining the entrance to the adit, it was observed that the rock was only slightly weathered from the surface to a depth of some 10 feet. The underlying bedrock looked sound with very widely spaced jointing. In the adit itself, very little rock appeared to have spalled and fallen, even though the adit entrance has been open and unprotected for some 83 years.

From subsequent discussion with PG&E representatives, it was learned that both adits had been used during the construction of the tunnel to Kerckhoff No: 1 Powerhouse. The adits were plugged on completion of tunnel construction and have not been opened or used since.

From the RM 286 viewpoint, the group made their way back along Smalley Road to Powerhouse Road and then north to the vicinity of Wishon powerhouse and Kerckhoff Lake to review recreational facilities. Lunch was taken near the town of North Fork. After lunch, an assessment was made of recreational facilities (camping and boating) at Kerckhoff Lake and then a visit was made to Big Creek No: 4, Redinger Dam and Big Creek No: 3. These were accessed by returning to Wishon powerhouse and then taking Redinger Lake Road.

Big Creek No: 4 Powerhouse

The Big Creek No: 4 Project was constructed between the years 1949 and 1952 and is FERC Project No: 2017. Water is supplied to Big Creek No: 4 by tunnel and penstock from the Redinger Lake Dam. Just upstream from the junction of the tunnel with the penstock is a surge chamber.

SCE did not allow access inside their facilities. Nevertheless, the exterior of the powerhouse, the incoming penstocks, switchyard, tailrace and river channel downstream of the powerhouse were viewed.

The powerhouse structure is 91 feet by 135 feet and is constructed of reinforced concrete. Although not seen during this field trip, the powerhouse has five floors comprising a draft tube floor, turbine floor, generator floor, storage floor, and erection floor. Normal tailwater level is 986.5 feet.

The powerhouse contains two Francis-type, vertical shaft, hydraulic reaction turbines. Each turbine is rated 66,000 hp, design head 383 feet and speed 257 rpm. Each turbine is equipped with a 120-inch turbine shut-off butterfly valve. Each main turbine is directly connected to a vertical shaft, totally enclosed generator. Unit No: 1 generator is an Allis Chalmers unit and Unit No: 2 is a General Electric unit. Each generator is rated at 50Mw. Generation voltage is 11.5 kV.

Station electrical service is supplied by a small 450 hp horizontal, Francis-type water turbine with design head of 383 feet and speed of 1,200 rpm. This is connected to a 300 kW generator. Water is supplied to this small turbine from a 14-inch penstock taken off Unit No: 1 main turbine penstock upstream of its butterfly type turbine shut-off valve.

Two 220 kV transmission lines convey energy from the project. One goes to the Big Creek No: 3 Powerhouse and the other goes in the direction of Springville.

Redinger Lake Dam

Redinger Lake Dam was accessed by continuing along Redinger Lake Road from Big Creek No: 4 Powerhouse. The road runs past the right abutment of the dam where there is ample public parking.

The Redinger Lake Dam (sometimes referred to as Big Creek Dam No: 7) and intake structure are located about 6.3 river miles upstream of the Big Creek No: 4 Powerhouse. The dam is a concrete gravity dam, 250 feet high. The top, at elevation 1,413.5 feet, is 875 feet long. The spillway has a crest elevation of 1,373 feet and is equipped with three 40-foot wide by 30-foot high radial gates. These gates are located approximately in the middle section of the dam crest. Normal maximum operating water level is elevation 1,403 feet.

The intake to the power tunnel leading to the Big Creek No: 4 Powerhouse is located on the face of the dam to the right (looking downstream) of the spillway gates. This intake has full height trash racks. The intake is divided into two rectangular openings, which may be closed by two, cable-suspended, electric hoist operated, 8-feet, by 17-feet-8-inch, fixed wheel gates.

The outlet makes a transition to a 115-foot-long, 17-foot-diameter, welded steel pipe within and just beyond the dam section and thence to the unlined power tunnel.

A turbine-generator unit installed at the dam recovers energy from water released through the dam for instream flow purposes. The turbine is a Francis-type horizontal shaft, hydraulic reaction turbine rated at 500 hp with design head 222 feet and speed 1,200 rpm. It is connected to a 350 kW generator, which feeds into the local 12 kV distribution system.

Big Creek No: 3 Powerhouse

Big Creek No: 3 Powerhouse could only be viewed from a distance. From the dam, Redinger Lake Road continues in the direction of Big Creek Powerhouse No: 3 until it reaches Chawanakee Schoolhouse. At that point all entrances to the Big Creek No: 3 Powerhouse area were closed and locked.

Information on this project has been requested from SCE and will be presented in a subsequent technical report. It is understood that the total installed capacity of the Big Creek No: 3 Powerhouse is 174.45 MW. The FERC Project Number is 120.

Fine Gold Creek

The Fine Gold Creek area was accessed by road from Chawanakee through North Fork and then south on North Fork Road. The general reservoir area was viewed as well as the Fine Gold Creek damsite location.

FIELD TRIP – THURSDAY, JUNE 19

The field team proceeded by road to Auberry taking the previous route and thence to Wishon Powerhouse to meet with Nicholas Markevitch, Senior License Coordinator in the Hydro Generation Department of PG&E. He came from the PG&E San Francisco Office to accompany the field team on its visit to the PG&E facilities. Kerckhoff Dam was visited first. Access was by boat from Wishon Powerhouse.

Kerckhoff Dam

Kerckhoff Dam, Kerckhoff No: 1 Powerhouse and Kerckhoff No: 2 Powerhouse are all covered by FERC Project Number 96.

Kerckhoff Dam impounds Kerchoff Lake which serves as the forebay for both Kerckhoff No: 1 and No: 2 powerhouses. The dam is a concrete arch, approximately 114 feet in height. The top of the dam is at elevation 994.50 feet. The spillway crest is at elevation 971.34 feet. The normal maximum water surface is at elevation 985.00 feet.

Separate intakes and water conveyance systems are provided for Kerckhoff No: 1 and No: 2 powerhouses and the intakes are located on the south bank of Kerckhoff Lake near the dam. For Kerckhoff No: 1, the intake structure is constructed of concrete and is equipped with two steel, slide gates. The intake for Kerckhoff No: 2 is a concrete-lined box structure located upstream of the Kerckhoff No: 1 intake.

Wishon Powerhouse

The A.G. Wishon Powerhouse was commissioned in 1919. It is part of the Crane Valley Hydroelectric Generating Facility, FERC Project Number 1354.

The Wishon Powerhouse is located on the shore of Kerckhoff Reservoir. The powerhouse is a reinforced concrete and steel framed, bi-level building, approximately 75 feet by 150 feet in size. It houses four generating units consisting of horizontal single-overhung impulse turbines connected to generators with a total capacity of 20 MW. Generation voltage is 2,300v. Water from the turbines discharges into Kerckhoff Lake.

The water supply for Wishon comes from Corrine Lake, located approximately 0.5 mile northeast of the powerhouse. Two penstocks, located east of the Wishon Powerhouse on a steep slope, convey water between Corrine Lake and the powerhouse. The penstocks are approximately 4,300 feet long. The diameter of the top half of the penstocks ranges from 40 to 44 inches. The diameter of the lower half of the penstocks ranges from 34 to 36 inches. They have a total flow capacity of 235 cfs.

Transmission lines at the project include a 70 kV line from the San Joaquin No: 3 development and a 70 kV line to the Coppermine substation.

Kerckhoff No: 1 Powerhouse

The Kerckhoff No: 1 Powerhouse is a reinforced concrete, tri-level building approximately 46 feet by 99 feet inside. It houses three vertical, Francis-type turbines directly coupled to generators with a total capacity of 38 MW. The normal maximum gross head is 350 feet and the turbine speed is 360 rpm. Generation voltage is 6,600v. Each turbine has a butterfly type shut-off valve. The project was commissioned in 1920.

In the lower sections of the powerhouse, there were wall sections where the bedrock had been left exposed. These sections appeared very stable with little or no spalling. This attests to the high quality of the rock.

Water supply to Kerckhoff No: 1 is by an approximately 16,943 feet long unlined tunnel leading to three penstocks, ranging from 913 to 945 feet in length. A surge chamber is located at the end of the tunnel but upstream from the penstock gate valve.

Three 115 kV transmission lines serve Kerckhoff No: 1 and No: 2 powerhouses.

Kerckhoff No: 2 Powerhouse

The Kerckhoff No: 2 Powerhouse is approximately 200 feet underground in a circular, rock chamber measuring 85 feet in diameter and 124 feet high. It houses a single, vertical Francis-type turbine/generator assembly. It operates at a normal maximum gross head of 421 feet and has a normal operating capacity of 155 MW. Turbine speed is 180 rpm. The turbine has a butterfly type shut off valve.

As with Kerckhoff No: 1 Powerhouse, much of the sides of the Kerckhoff No: 2 Powerhouse are unlined and very little spalling of rock appears to have taken place, providing additional evidence on the soundness of the rock formation.

Vehicles may access the powerhouse from Smalley Road through an unlined tunnel southwest of the switchyard. A rollup door, which restricts access to the powerhouse to authorized personnel only, is at the portal to the tunnel. The powerhouse may also be accessed through a vertical shaft located in the switchyard. The project was commissioned in 1983.

Water is conveyed from the intake in Lake Kerckhoff to Kerckhoff No: 2 Powerhouse by means of a tunnel and penstock. The tunnel is approximately 21,632 feet long and has both lined and unlined sections. A surge chamber is located at the end of the tunnel near the intake for the penstock and consists of an unlined, tapered vertical shaft. An approximately 1,013 feet long concrete and steel lined penstock conveys water from the tunnel to the powerhouse. The penstock has a 20-foot diameter, 481-foot long concrete lined section, an 18-foot diameter, 338-foot long concrete-lined section and a 15-foot diameter, 194-foot long steel-lined section that enters the powerhouse chamber. It has a total flow capacity of 5,100 cfs.

Adjacent to the switchyard is an adit that was used during the construction of the tunnel for Kerckhoff No: 2. This was plugged following project completion in 1983 and has not been used since.

A tailings pile generated during tunnel construction is located downstream of the Kerckhoff Powerhouse outlet works. It extends a distance of approximately 1,000-foot along the left side of the river, on the uppermost perimeter of Lake Millerton. It appears to have been placed as an engineered fill, sloping at about 1½ to 1 (horizontal to vertical), with concrete-lined drainage benches. The tailings appear to consist solely of granitic rock fragments and rock flour.

Yokohl Creek Site

The field team proceeded to the Yokohl Creek Site from Auberry via Auberry Road, Route 168, Academy Avenue, Route 99, and Route 198 to Yokohl and thence to the site location.

For reference, details of the Yokohl Creek site are given in the Draft Technical Memorandum dated March 2003 on the Yokohl Valley Reservoir.

The site location was inspected and afterwards the team proceeded to the Friant-Kern Canal to look at a possible location for a forebay for a pump/generating station. The potential forebay site is located on the east side of the Friant-Kern Canal, about ¾-mile northeast of the small community of Tonyville. It consists of a relatively level, roughly triangular parcel of agricultural land within a small side valley at the base of the adjacent low mountains. Based on USGS topographic maps (20-foot contour intervals), it appears that the forebay could potentially cover about 15 to 20 acres.

Water from the forebay would be pumped into the reservoir through the adjacent mountain via an approximately 1- to 1½-mile long tunnel. The tunnel would traverse Jurassic ultrabasic rocks variably altered to serpentine. The serpentine is dark green and massive, and is considered sound. It locally grades to dark to light green schistose to sub-schistose serpentinitized rock. The serpentinite forms bold to inconspicuous outcrops that are lightly to moderately weathered and moderately jointed.

FIELD TRIP – FRIDAY, JUNE 20

Millerton Lake Tour

The boat tour began at 10:00 am and Friant Dam was viewed from the upstream side. Various aspects of raising Friant Dam were pointed out. Following this, the boat proceeded to the locations of:

- RM 274 Dam Location;
- RM 279 Dam Location; and
- Fine Gold Dam Location.

For reference, further details of these sites are given in Draft Technical Memoranda for Temperance Flat and for Fine Gold Reservoir, both draft memoranda dated February, 2003.

At the RM 274, RM 279 and Fine Gold Creek dam sites, the proximity of reservoirs downstream is such that powerhouses for each of these sites will be at or close to the dams themselves and not at remote locations. Penstocks would likely be through the dam structures or abutments and would be relatively short.

Power transmission lines dedicated to the projects would be required from the powerhouses to suitable interconnection points on the power grid system.

Attachments

Field Trip Photos

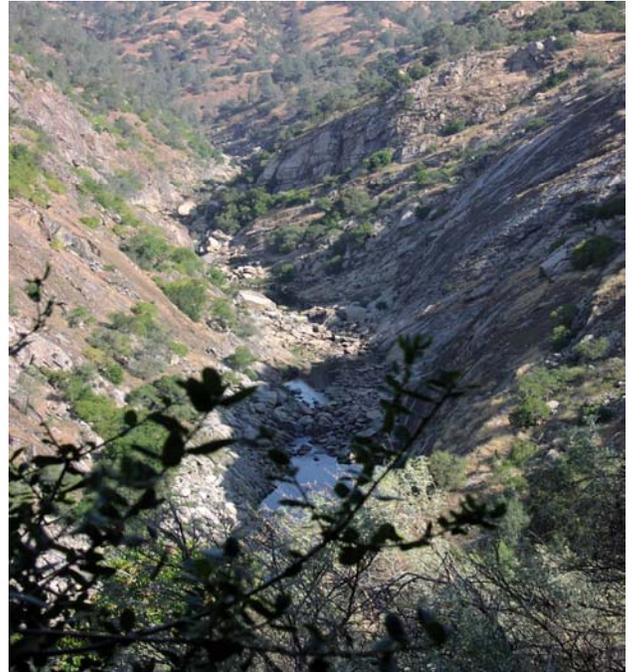
- A. RM 286
- B. Big Creek No. 4 Powerhouse
- C. Redinger Dam
- D. -
- E. -
- F. Kerckhoff Dam
- G. Wishon Powerhouse
- H. Kerckhoff No. 1 Powerhouse
- I. Kerckhoff No. 2 Powerhouse
- J. -
- K. -



A-286 Site ~01.JPG

6/18/2003

Downstream view



A-286 Site ~02.JPG

6/18/2003

Upstream view of 286 site



A – 286 Site ~03.JPG

6/18/2003

Upstream View



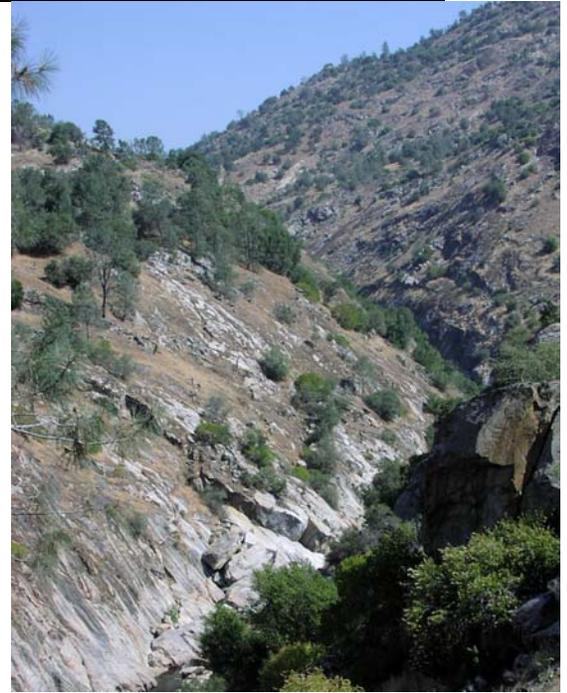
A – Downstream Adit ~02.JPG

6/18/2003

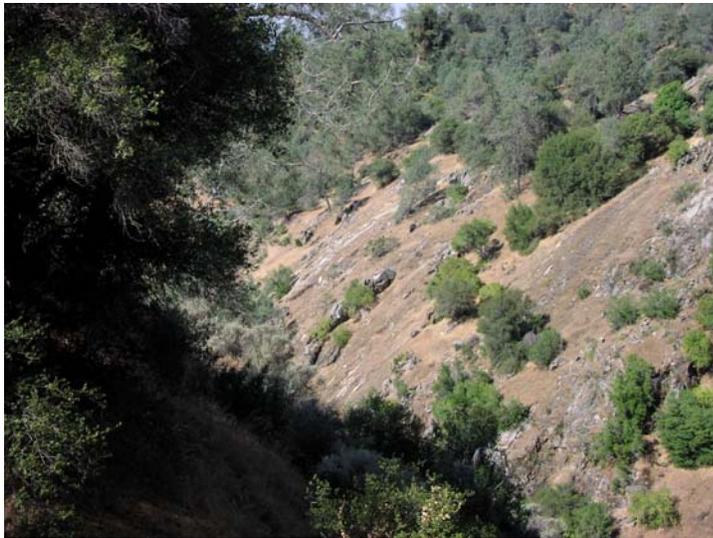
Downstream View from Downstream Adit



A – 286 Site ~05.Jpg
6/18/2003
Downstream View.



A – Downstream Adit ~04.jpg
6/18/2003
Upstream View from Downstream adit



A – Downstream Adit ~01.JPG
6/18/2003
Downstream View from Downstream Adit

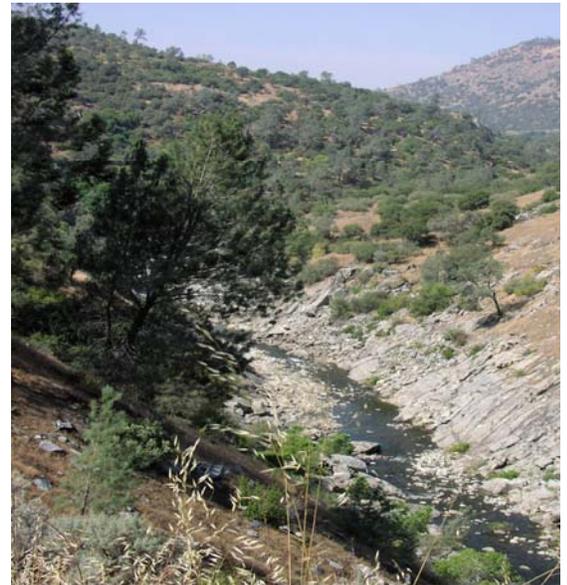


A – Downstream adit ~07.jpg
6/18/2003
Entrance to access tunnel



A- Downstream Adit ~03.jpg
6/18/2003

Upstream view from downstream adit. Phil Unger



A – Downstream Adit ~05.jpg
6/18/2003

Downstream view from downstream adit



A – Downstream Adit ~11.jpg
6/18/2003
Owl in access tunnel



A – Downstream Adit ~09.jpg
6/18/2003
Downstream adit access tunnel



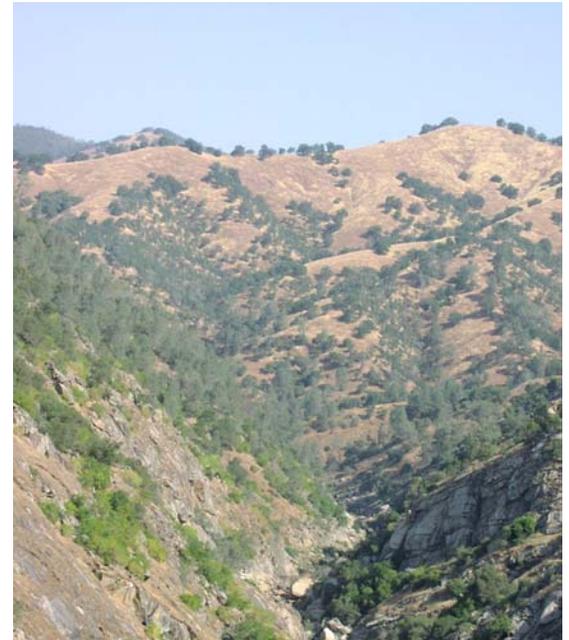
A – Downstream adit ~14.jpg
6/18/2003
Downstream Adit Entrance



A – Downstream adit ~12.jpg
6/18/2003
Downstream adit tunnel access



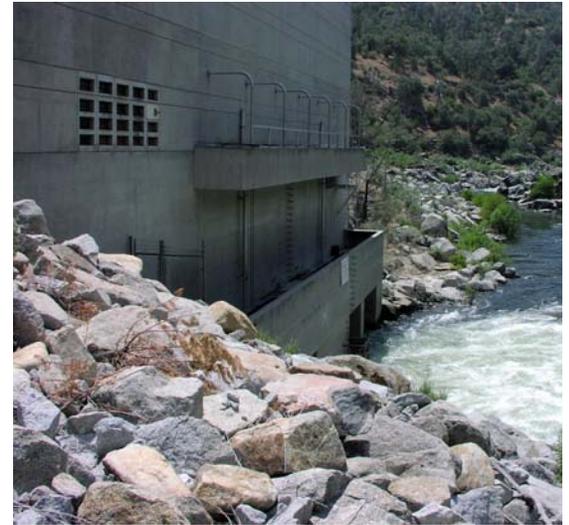
A – Upstream Adit ~2.jpg
6/18/2003
Upstream view



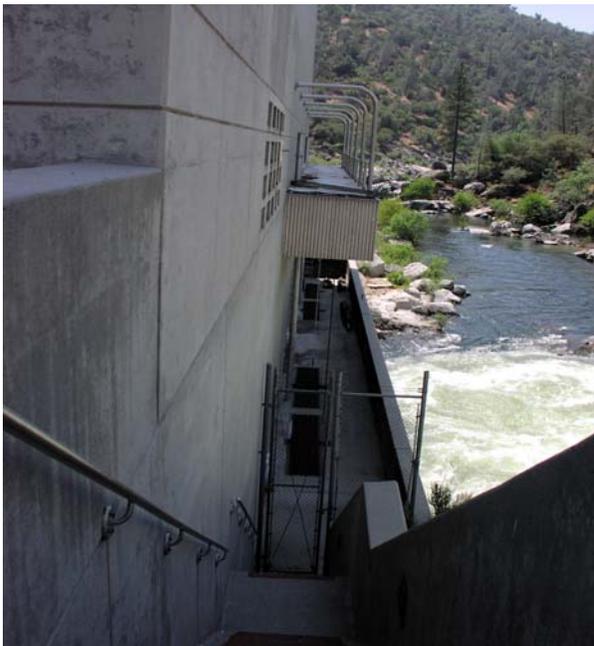
A – Upstream Adit ~4.jpg
6/18/2003
Downstream view



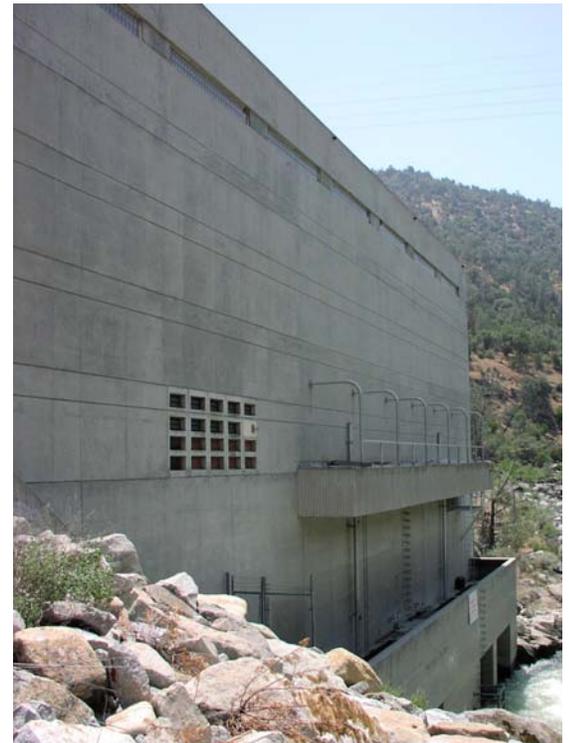
B – Big Creek 4 PH ~02.jpg
6/18/2003
Switchyard



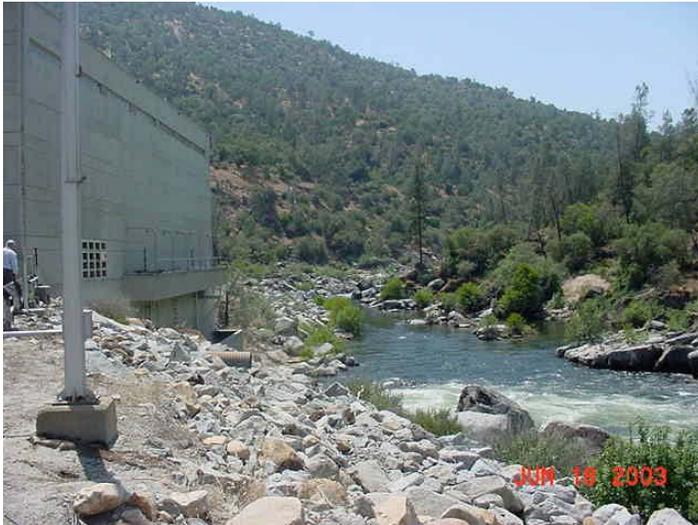
B – Big Creek 4 PH ~03.jpg
6/18/2003
Tail water of powerhouse



B – Big Creek PH ~06.jpg
6/18/2003
Tailwater of powerhouse.



B – Big Creek PH ~05.jpg
6/18/2003
Tailwater of powerhouse.



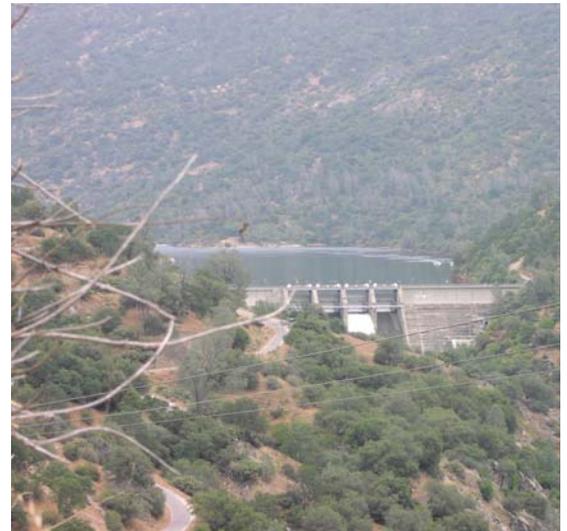
B – Big Creek PH ~09.jpg
6/18/2003
Tailwater of powerhouse



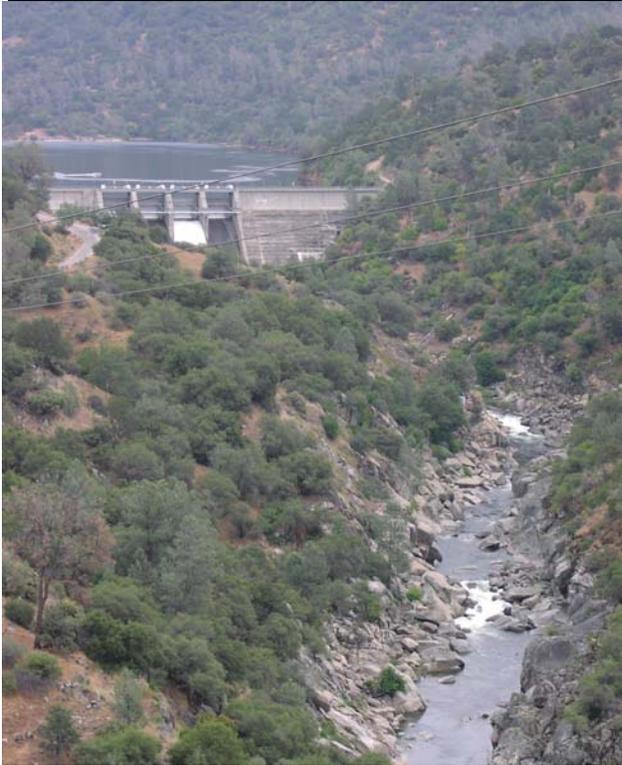
B – Big Creek PH ~07.jpg
6/18/2003
Upstream view from powerhouse



B – Big Creek PH ~04.jpg
6/18/2003
View from Access Gate



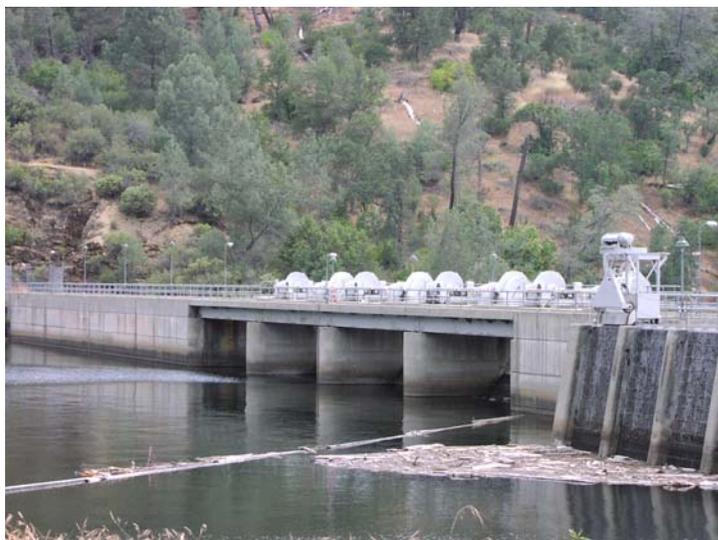
C – Redinger Dam ~01.jpg
6/18/2003



C – Redinger Dam ~03.jpg
6/18/2003



C – Redinger Dam ~07.jpg
6/18/2003



C – Redinger Dam ~06.jpg
6/18/2003



C – Redinger Dam ~08.jpg
6/18/2003



C – Redinger Dam ~10.jpg
6/18/2003



C – Redinger Dam ~13.jpg
6/18/2003
Downstream Spillway



C – Redinger Dam ~12.jpg
6/18/2003



F – Kerckhoff Dam ~01.jpg
6/19/2003



F – Kerckhoff Dam ~02.jpg
6/19/2003



F – Kerckhoff Dam ~05.jpg
6/19/2003

Downstream view from Kerckhoff Dam.



F – Kerckhoff Dam ~04.jpg
6/19/2003



F – Kerckhoff Dam ~06.jpg
6/19/2003

Upstream view from Kerckhoff Dam.



F – Kerckhoff Intakes ~01.jpg

6/19/2003

View of intakes from lakes



F – Kerckhoff Intakes ~02.jpg

6/19/2003

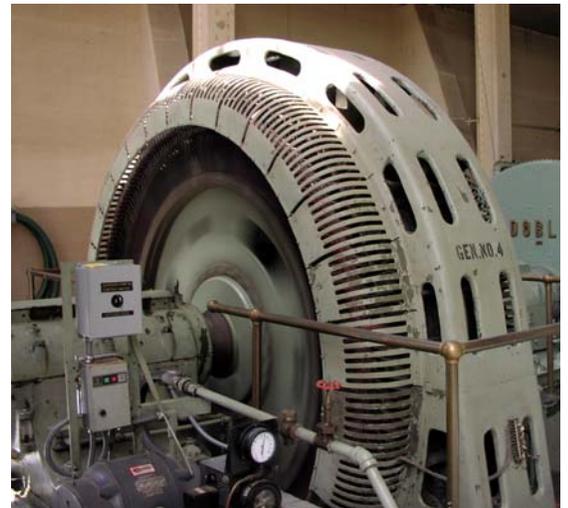
View of intakes from lake



F – Kerckhoff Intakes ~03.jpg

6/19/2003

View of intakes from lake



G – Wishon PH ~01.jpg

6/19/2003

Generator



G – Wishon PH ~02.jpg

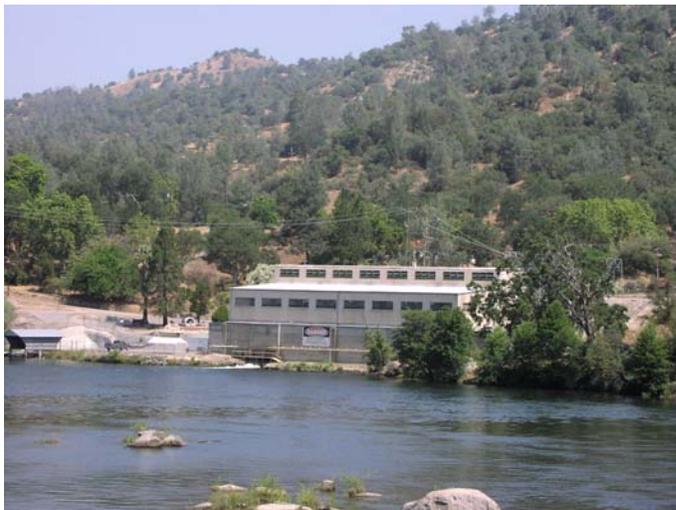
6/19/2003

Generator



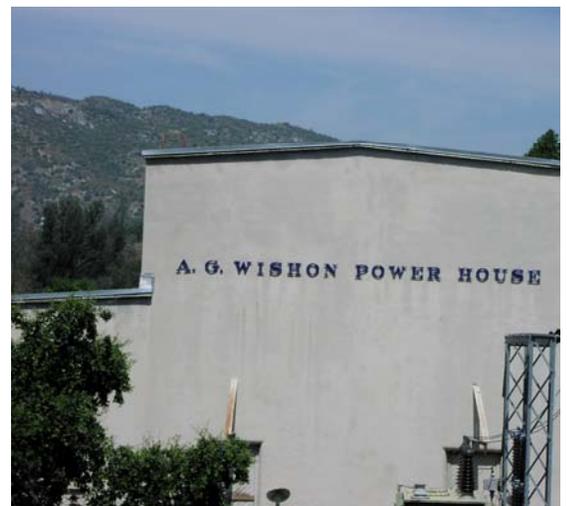
G – Wishon PH ~03.jpg

6/19/2003



G – Wishon PH ~04.jpg

6/19/2003



G – Wishon PH ~05.jpg

6/19/2003



G – Wishon PH ~06.jpg
6/9/2003



G – Wishon PH ~07.jpg
6/19/2003



G – Wishon PH ~08.jpg
6/19/2003



G – Wishon PH ~10.jpg
6/19/2003



G – Wishon PH ~11.jpg
6/19/2003



G – Wishon PH ~12.jpg
6/19/2003



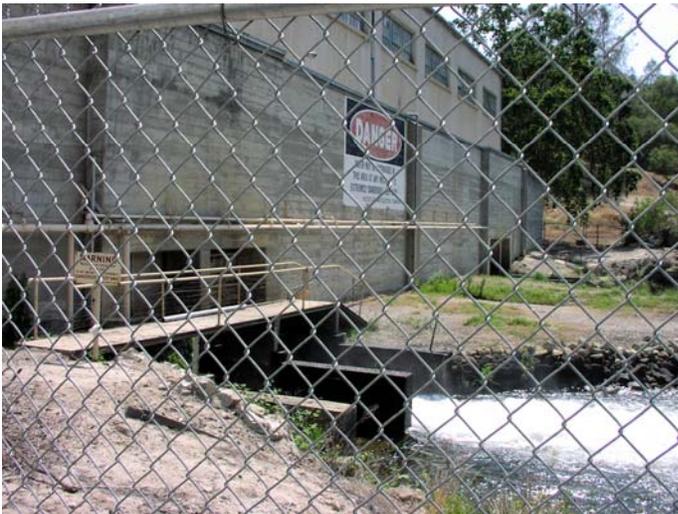
G – Wishon PH ~13.jpg
6/19/2003



G – Wishon PH ~14.jpg
6/19/2003



G – Wishon PH ~15.jpg
6/19/2003
Switchyard



G – Wishon Tailwater ~01.jpg
6/19/2003
Tailwater



G – Wishon Tailwater ~02.jpg
6/19/2003
Tailwater



H – Kerckhoff 1 PH ~01.jpg
6/19/2003



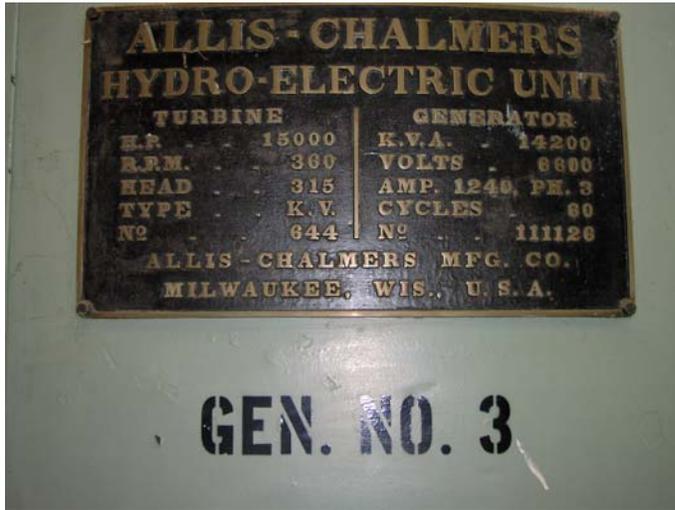
H – Kerckhoff 1 PH ~02.jpg
6/19/2003



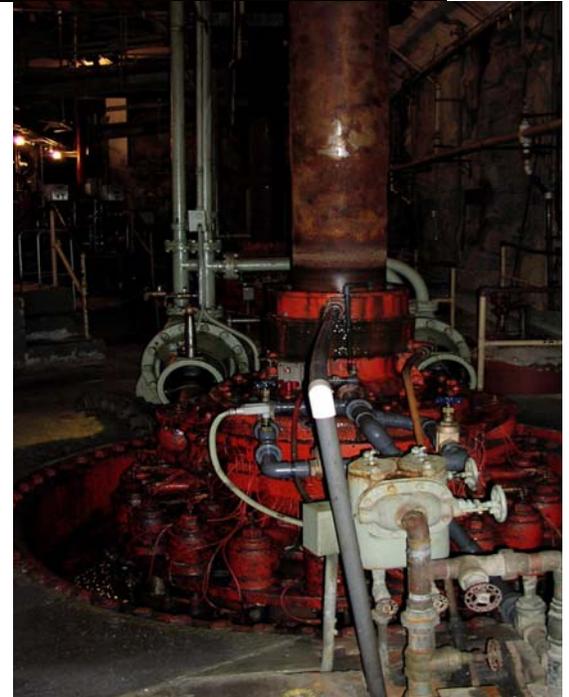
H – Kerckhoff 1 PH ~03.jpg
6/19/2003
Switchyard



H – Kerckhoff 1 PH ~04.jpg
6/19/2003



H – Kerckhoff 1 PH ~05.jpg
6/19/2003



H – Kerckhoff 1 PH ~06.jpg
6/19/2003
Turbine



H – Kerckhoff 1 PH ~07.jpg
6/19/2003
Building facilities



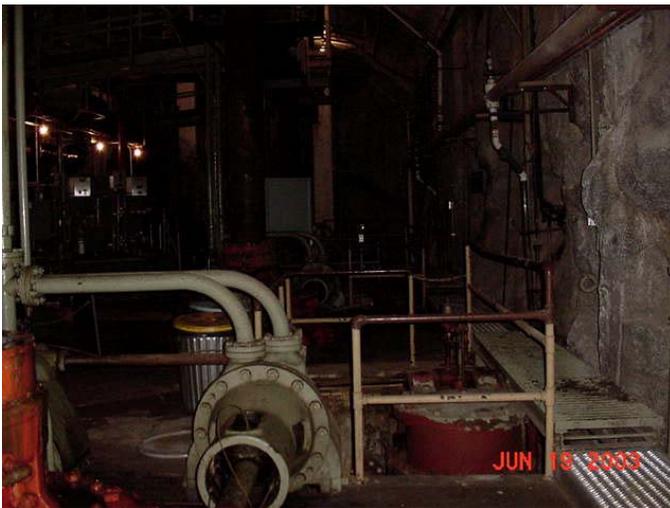
H – Kerckhoff 1 PH ~08.jpg
6/19/2003
Generator



H – Kerckhoff 1 PH ~09.jpg
6/19/2003



H – Kerckhoff 1 PH ~10.jpg
6/19/2003



H – Kerckhoff 1 PH ~11.jpg
6/19/2003



H – Kerckhoff 1 PH ~12.jpg
6/19/2003



H – Kerckhoff 1 PH ~13.jpg
6/19/2003
Generator



I – Kerckhoff 2 PH ~01.jpg
6/19/2003



I – Kerckhoff 2 PH ~02.jpg
6/19/2003
Access tunnel entrance



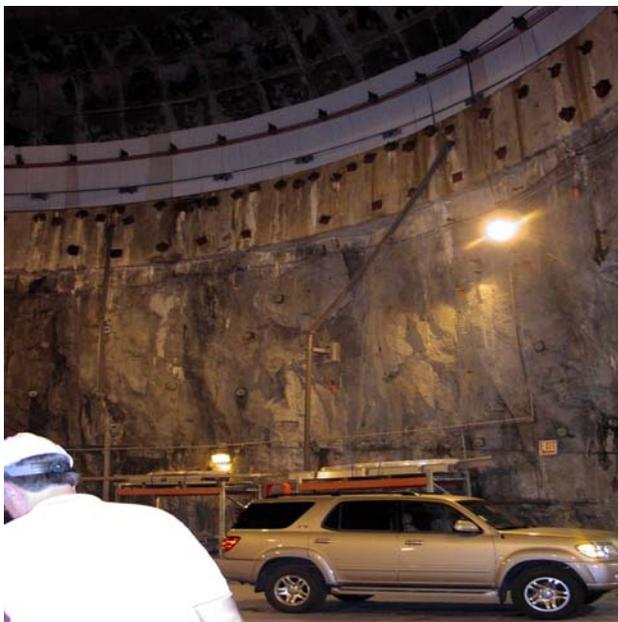
I – Kerckhoff 2 PH ~03.jpg
6/19/2003
Switchyard



I – Kerckhoff 2 PH ~04.jpg
6/19/2003
Access tunnel entrance



I – Kerckhoff 2 PH ~05.jpg
6/19/2003
View looking up from inside of tunnel
powerhouse



I – Kerckhoff 2 PH ~06.jpg
6/19/2003
View inside tunnel powerhouse



I – Kerckhoff 2 PH ~07.jpg
6/19/2003
Access tunnel to powerhouse



I – Kerckhoff 2 PH ~08.jpg

6/19/2003

Generator inside tunnel powerhouse



I – Kerckhoff 2 PH ~09.jpg

6/19/2003

Tunnel road



I – Kerckhoff 2 PH ~10.jpg

6/19/2003

Tunnel Road



I – Kerckhoff 2 PH ~11.jpg

6/19/2003

Tunnel



I – Kerckhoff 2 PH ~12.jpg

6/19/2003

Facilities

APPENDIX B

Environmental Field Trip Reports

Temperance Flat Reservoir

APPENDIX B.1

Environmental Team Trip Report 1

(May 29-30, 2002)

ENVIRONMENTAL TRIP REPORT

TEMPERANCE FLAT RESERVOIR

INTRODUCTION

A team of environmental specialists completed an initial field trip to Friant Dam and Millerton Lake, including the portion of Millerton Lake at Temperance Flat, on May 29 and 30, 2002. The field trip was the first task in the environmental study of several potential surface storage options identified for initial review during the Upper San Joaquin River Basin Storage Investigation. For initial consideration, the environmental review focused mainly on construction and potential upstream impacts associated with surface storage sites. The site visit provided an opportunity to conduct preliminary reconnaissance of existing resources at the various locations for the following resource areas: terrestrial biology; aquatic biology and water quality; recreation; cultural resources; and land use.

This appendix includes a brief overview of the resource specialists' observations, trip logs prepared by team members, photographs taken during the field trip, and maps used to identify and review existing resources.

SUMMARY OF FIELD OBSERVATIONS

This measure would involve constructing a new dam at the upper end of Millerton Lake. Three possible locations referred to as the lower, middle and upper dam sites were under consideration at the time of the environmental field trip. Existing facilities include: Millerton Lake, developed recreation areas, Kerkhoff Powerhouses Nos. 1 and 2, ancillary hydropower facilities, private residences, paved roads, unpaved roads, and trails.

Botany

Upland vegetation is blue oak foothill woodland and areas of open grassland and rock outcroppings.

Habitat losses depend on the dam height chosen but could be substantial.

Effects on special status plant species are unknown.

Wildlife

Possible special status plants in the area include peregrine falcon and bald eagle nesting and foraging habitat.

This area may be used by deer as wintering or migrating habitat.

Aquatic Biology/Water Quality

The shoreline in much of the portion of Millerton Lake that would be affected by a Temperance Flat Dam is steep-sided and rocky with little vegetation.

The shoreline near the Temperance Flat Recreation Area is gradual with many bushes and trees. This area would provide excellent fish habitat if inundated by a new reservoir.

A dam at Temperance Flat would probably enhance fisheries of the upper reservoir.

The resources and issues associated with this alternative are similar to those associated with raising Friant Dam.

Recreation

The resources associated with this alternative are similar to those associated with raising Friant Dam.

Cultural Resources

The resources associated with this alternative are similar to those associated with raising Friant Dam.

Land Use

The resources associated with this alternative are similar to those associated with raising Friant Dam. However, because there are less homes in the Temperance Flat area than on the southeastern shore of Millerton Lake, less homes are likely to be within the inundation area at Temperance Flat than in the Friant Dam raise measures.

Environmental Team Field Trip Log - Botany		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	Jeff Glazner/Barry Anderson/David Stevens	
Date:	June 5, 2002	

Weather Conditions:	Hot and Dry
Areas Covered (attach map with notations)	
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

None.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Upland vegetation is blue oak foothill woodland and areas of open grassland, rock outcroppings. Some riparian vegetation along the river. Seeps, springs, and other

wetlands could be present.

Need for additional (engineering/hydrological, or other) information on measures

-
- Geology or soils information
 - Spillway elevation and limits of inundation for each damsite
 - Location of new electric transmission line (if needed)
 - Locations of new recreational facilities and campgrounds
 - Location of work pads, access roads, and other construction areas
-

Additional data needs (within each specific discipline)

-
- CNDDDB report
 - CNPS report
 - Ceres report
 - Field surveys for wetlands and special status species and habitats
-

Environmental Team Field Trip Log - Wildlife		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	Dave Stevens, Stephanie Murphy	
Date:	June 5, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	
Attachments	
Photo Log	
Photos	
Topographic Map(s)	

Field Observations:

Existing Facilities:

None

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Upland vegetation is blue oak foothill woodland and areas of open grassland, rock

outcroppings. Possible sensitive species in the area include peregrine falcon and bald eagle nesting and foraging habitat. This area may be utilized by deer as wintering or migrating habitat. Further studies would need to be completed to further define sensitive species in the area.

Need for additional (engineering/hydrological, or other) information on measures

-
- Need map showing each alternative dam location, inundation levels, calculated acreages of habitat loss, etc.
 - Topo that shows inundation zone and extent of loss of various habitats including tributary creeks.
-

Additional data needs (within each specific discipline)

-
- Need to coordinate with resource agency biologists and agency files on known distribution of sensitive species for this area.
-

Environmental Team Field Trip Log – Fisheries and Water Quality		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	Phil Unger	
Date:	June 7, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	Upper Millerton Lake from Temperance Flat and San Joaquin River upstream to Kerkhoff Dam
Attachments	
Photo Log	No
Photos	Yes
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

Existing facilities include upper Millerton Lake, Kerkhoff Powerhouses Nos. 1 and 2 and ancillary hydropower facilities, and roads and campgrounds.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is a large reservoir set in the lower foothills of the Sierras. The lower portion of the reservoir (downstream of Temperance Flat) is fairly open and mostly surrounded by low hills, while the upper portion (Temperance Flat and upstream) is narrow and mostly steep-sided. However, the lower portion immediately downstream of Temperance Flat is very narrow and steep-sided. This trip log covers the upper portion of the reservoir. The reservoir water level was high at the time of the field trip and much of the shoreline aquatic habitat was out of view. The shoreline in much of this portion of the reservoir is steep-sided and rocky, with little vegetation, but the shoreline near the Temperance Flat Recreation Area is gradual with many bushes and trees that would provide excellent fish habitat if flooded. Partially submerged trees (mostly willows) were observed in the Temperance Flat Recreation Area.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Temperance Flat Reservoir at each proposed damsite.

Need the following bathymetry data for each damsite:

- Mean depth for each month, April – October.
- Mean surface area of shallow water habitat (less than 15 feet deep) in each month, April – October.
- Mean rate of water level fluctuation for each month, April – October.

Need to know how Millerton Lake operations would be affected after construction of Temperance Flat, including the magnitude and timing of lake level fluctuations, and how operation of Temperance Flat would affect upstream reservoirs, particularly Kerkhoff and Redinger.

Need detailed information on predicted water depths and flows in the San Joaquin River downstream of Kerkhoff Dam to Millerton Lake, during May and June (American shad and striped bass spawning seasons), for each proposed damsite.

Additional data needs (within each specific discipline)

Need the following information:

- Principal fish species of Millerton Lake.
 - Water temperature, dissolved oxygen profiles and any other existing water quality data from Millerton Lake, especially from sites near Temperance Flats and upstream.
-

-
- Information on American shad and striped bass spawning runs in the San Joaquin River upstream of Millerton Lake.
 - Information on abundance and distribution of hardhead and other fish species in the San Joaquin River upstream of Millerton Lake.
 - Water temperature and other water quality data for the San Joaquin River upstream of Millerton Lake.
 - Information on the location and types of active and abandoned mines in the inundation zone of the proposed reservoir.
-

Environmental Team Field Trip Log - Recreation		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	Sandra Perry	
Date:	June 3, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	Millerton Lake from Friant Dam to Kerkhoff Reservoir
Attachments	
Photo Log	No
Photos	No
Topographic Map(s)	Yes (see S1)

Field Observations:

Existing Facilities:

This project would involve constructing a new dam at the upper end of Millerton Lake. Three possible locations referred to as the lower, middle and upper damsites are proposed. Existing facilities include: Millerton Lake, developed recreation areas, Kerkhoff Powerhouses Nos. 1 and 2, ancillary hydropower facilities, private residences, paved roads, unpaved roads, and trails.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is part of the Millerton Lake State Recreation Area and is also bordered by significant areas of public lands managed by the BLM. Temperance Flat is situated within the boundaries of the BLM's Squaw Leap Management Area. Millerton Lake is an important low elevation recreation destination and provides both water-oriented and land based recreation opportunities. Existing recreation facilities in the vicinity of Temperance Flat include:

- Developed Campgrounds
- Day Use Areas
- Recreation Residences
- Paved and unpaved roads
- Hiking and Equestrian Trails

Constructing Temperance Flat Dam would submerge portions of the San Joaquin River upstream of Millerton Lake to Kerkhoff Reservoir. The area between Kerkhoff Reservoir and Millerton Lake is used by whitewater boaters and anglers.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Temperance Flat Reservoir at each proposed damsite.

Need to know how Millerton Lake operations would be affected after construction of Temperance Flat, including the magnitude and timing of lake level fluctuations.

How would operation of Temperance Flat affect other reservoirs, particularly Kerkhoff and Redinger.

Additional data needs (within each specific discipline)

Need the following recreation-related information:

Exact location of existing recreation facilities along Millerton Lake, and potentially Kerkhoff Reservoir, with respect to inundation areas.

Additional information about whitewater boating and angling use between Millerton and Kerkhoff Reservoirs

Use levels by activity for lake, river and land based recreation activities

Environmental Team Field Trip Log – Cultural Resources		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	David White	
Date:	May 29, 30 2002	

Weather Conditions:	Hot & dry
Areas Covered (attach map with notations)	Millerton Lake/San Joaquin River, aerial reconnaissance May 29. Millerton Lake and San Joaquin River by boat, May 30. Also see Trip Log S1.
Attachments	
Photo Log	Yes – MWH 0205
Photos	Yes – no.55
Topographic Map(s)	Millerton Lake East quad

Field Observations:

Existing Facilities:

Friant Dam downstream; Temperance Flat would be new dam

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Cultural resources:

Prehistoric: permanent water source (San Joaquin River) formerly had salmon, other fishery resources; Blue Oak woodland was an attractive resource for acorns, and other riparian vegetation contributed to a diverse resource base. High probability of prehistoric archaeological sites including BRM stations, hunting & fishing camps, seasonal village sites.

Historic: Various sites likely, associated with mining, reservoir development.

Need for additional (engineering/hydrological, or other) information on measures

Need precisely mapped footprint of reservoir, with various potential dam levels; also need footprint of all associated project-related ground disturbance areas, to include but not be limited to project offices and maintenance buildings, construction set-up and lay-down areas, access roads, electric transmission lines, water conveyance structures, and all other project facilities.

Additional data needs (within each specific discipline)

Need archaeological records search with California Historic Resources Inventory System (CHRIS) information center. Clearinghouse: Southern San Joaquin Valley Info Center, CSU-Bakersfield.

Need consultation with the BuRec cultural resource specialist regarding sites that may not be recorded with the CHRIS information center.

Also need brief review of archaeological and ethnographic literature pertaining to the area. Minimal level of effort: (1) to identify types of archaeological remains expected, time periods represented; and (2) to identify Native American tribes historically occupying the area.

Environmental Team Field Trip Log – Land Use		
Trip Log Number:	S2	Project No.: 8004094
Dates:	May 29, 2002	
Site Name:	Temperance Flat Dam	
Location:	Upper end of Millerton Lake to Kerkhoff Reservoir	
Prepared By:	Irina Torrey	
Date:	June 12, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	Millerton Lake from Friant Dam to Kerkhoff Reservoir
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

This measure would involve constructing a new dam at the upper end of Millerton Lake. Three possible locations referred to as the lower, middle and upper damsites are proposed. Existing facilities include: Millerton Lake, developed recreation areas, Kerkhoff Powerhouses Nos. 1 and 2, ancillary hydropower facilities, private residences, paved roads, unpaved roads, and trails.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Millerton Lake is part of the Millerton Lake State Recreation Area and is also bordered by significant areas of public lands managed by the BLM. Temperance Flat is situated within the boundaries of the BLM's Squaw Leap Management Area.

There may be residences that would be within the inundation area of the new dam at Temperance Flat.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by Temperance Flat Reservoir at each proposed damsite.

Additional data needs (within each specific discipline)

Need to know if any houses or other private uses are within the inundation area.

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Picture: P5300066 Temperance Flat, on San Joaquin River, May 30, 2002, midday



Millerton Lake, Temperance Flat

5/31/02



Millerton Lake, flooded trees in Temperance Flat Recreation Area, 5/30/02



Millerton Lake, flooded willows in Temperance Flat Recreation Area, 5/30/02



Millerton Lake, flooded willows in Temperance Flat Recreation Area, 5/30/02



Millerton Lake, downstream from Temperance Flat Recreation Area, view SE towards Table Mt., 5/30/02

APPENDIX B.2

Environmental Team Trip Report 2

(June 17-19, 2003)

Upper San Joaquin River Basin Storage Investigation



Environmental Trip Report

August 6, 2003

Prepared for:
Bureau of Reclamation

Prepared by:



Upper San Joaquin River Basin Storage Investigation

Environmental Trip Report

August 6, 2003

Prepared for:
Bureau of Reclamation

Prepared by:



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1.0 INTRODUCTION

1.1 PURPOSE FOR THE TRIP

The MWH environmental team completed a field trip on June 17, 2002 for 15 potential options considered in Phase 1 of the Upper San Joaquin River Basin Storage Investigation. Since the completion of that report, one of the options, Temperance Flat Dam, was reconfigured to include several alternatives — each characterized by construction of a dam at different locations along the San Joaquin River — namely at river mile 274, 279, and 286, and with a range of potential water surface elevations from 800 to a maximum of 1600 (this varies for each option; see Table 1).

The purpose of the June 2003 field trip was to conduct a preliminary reconnaissance of the new Temperance Flat options. The trip was conducted on June 17 thru 19 and designed to provide a similar level of early pre-planning reconnaissance for all three options similar to the reconnaissance in the earlier field trip conducted on May 29 thru 31, 2002. The environmental team included key resource specialists in the areas of concern in developing any option within the range described above.

1.2 FIELD TRIP TEAM

The field trip team included the following project resource specialists: botanist, wildlife biologist, aquatic biologist, cultural resources specialist, recreation and geology specialist, land use planner, project coordinator, and project manager.

1.3 CONTENTS OF THE FIELD REPORT

This Field Report includes brief resource area overviews for each of the alternative options identified for study, trip logs for each of the sites visited, and photos. The existing conditions viewed during the field trip are briefly described and their implications for project development are noted. A subsequent report on site constraints and opportunities will develop the implications of site conditions with an initial impact hypothesis in somewhat greater detail.

1.4 ITINERARY

June 17th

10:00am	Meet at MWH Office
10:00am to 2:00pm	Travel to Clovis
2:00pm to 4:00pm	Meet with Tracy Rowland (car tour of San Joaquin River Gorge Area)

**TABLE 1. TEMPERANCE FLAT AREA STORAGE OPTIONS
(EXPANDED RANGE TO BE EVALUATED IN PHASE 1)**

Dam Site (River Mile)	Maximum Water Surface Elevation (ft)									Dam Types
	800	900	960	1100	1200	1300	1400	1500	1600	
274	TSC	MWH	MWH	TSC						CFRF
	0.5 MAF 3.3 K ac.	0.9 MAF 4.6 K ac.	1.2 MAF 5.6 K ac.	2.1 MAF 8.2 K ac.						
279		Done	MWH	Done	MWH	TSC				CFRF RCC
		0.4 MAF 2.7 K ac.	0.6 MAF 3.4 K ac.	1.3 MAF 4.0 K ac.	1.9 MAF 5.6 K ac.	2.7 MAF 9.4 K ac.				
286					TSC	MWH	TSC	MWH	TSC	CFRF RCC Arch
					0.5 MAF 3.2 K ac.	0.8 MAF 4.7 K ac.	1.4 MAF 6.3 K ac.	2.1 MAF 8.2 K ac.	3.0 MAF 10.0 K ac.	

Key: MWH or TSC (USBR Technical Service Center) – party responsible for cost estimate

Net new storage capacity (in millions of acre-feet, MAF)

Gross inundated area (in thousands of acres, K ac.)

Tentative - As of July 9, 2003

June 18th

7:00am	Meet in Hotel Lobby
7:00am to 8:00am	Travel
8:00am to 11:00am	Adit No. 1 Overlook/RM 286
11:00am to Noon	Lunch in Auberry
1:00pm	Wishon/Big Creek No. 4
3:00pm	Reddinger Dam and San Joaquin River Canyon
4:00pm	Chawanakee (Big Creek No. 3)
5:00pm	Chawanakee Schoolhouse and San Joaquin River Canyon
6:00pm	Fine Gold Reservoir Area (Road 210)
7:00pm	Fine Gold Dam site (Hidden Lake Estates)
8:00pm	Return to Clovis for a Late Dinner

June 19th

7:00am to 11:00am	Temperance Flat/Sullivan Mine (Meet with Marc Springer)
11:00am to Noon	Lunch on Boat
Noon to 5:00pm	Patterson Mine/Prospect (MP279) Site
5:00pm	Return Home

2.0 SITE RECONNAISSANCE OVERVIEW

2.1 KERCKHOFF HYDROELECTRIC GENERATING FACILITY NO. 1

2.1.1 Botany

- The San Joaquin River channel near PG&E's Kerckhoff Hydroelectric Generating Facility No. 1 (K-1) is deeply incised and rocky.
- Vegetation in the area is foothill woodland.
- Construction of the new or enlarged reservoirs may affect rare plant habitat through inundation of existing habitat.
- Carpenteria only occurs in the San Joaquin River drainage and has relatively narrow habitat requirements. In areas with suitable habitat that have not been surveyed by botanists it should be considered to have a moderate to high probability of occurring. Other special status species occur in habitats that are more common and widespread in the area. These species, too, have a moderate to high probability of occurring in areas that have not been surveyed.

2.1.2 Wildlife

- Wildlife habitat in the vicinity of K-1 consists of a mosaic of foothill woodland, chaparral, and small patches of grassland.
- The area is hilly and mountainous, but not so steep as to preclude large species of wildlife such as deer and black bear.
- The area is probably winter range for deer.
- Cattle grazing is quite evident in the area. Grazing has apparently substantially altered habitat quality throughout much of the area.
- Several species of special concern expected to occur in this area
- The Valley Elderberry Longhorn Beetle (VELB), a federally threatened species is likely to be present where elderberry shrubs are present.
- The western spadefoot toad, tiger salamander, foothill yellow-legged frog, coast horned lizard, American peregrine falcon, golden eagle, osprey and several species of bats are all likely inhabitants of this area.

2.1.3 Aquatic Biology/Water Quality

- The San Joaquin River near the K-1 runs in a deeply incised, low gradient, bedrock-controlled channel, forming a series of long pools separated by rock-fall debris.
- Flow downstream of the power plant was high at the time of the field visit and, therefore, much of the rock-fall debris was inundated, forming boulder-strewn run habitat.
- The high flow of the river downstream of the power plant indicated that it was operating.

- Normally, this power plant operates only during high flow periods and during May 15 through June 30. The May thru June flows are to enhance spawning conditions for American shad from Millerton Lake.
- The reach of the San Joaquin River downstream of the K-1 is the principal spawning habitat for American shad and striped bass from Millerton Reservoir. The shad population is the only known American shad population that is landlocked.
- A reservoir at the lower two Temperance Flat dam sites (RM 274 and RM 279) would inundate much or all of the San Joaquin River between Millerton Reservoir and Kerckhoff Reservoir, with potentially adverse effects on American shad and striped bass and two California State Species of Special Concern, hardhead and Kern brook lamprey. A petition has been submitted to list the Kern brook lamprey under the Endangered Species Act.
- Construction of the new or enlarged reservoirs would create new aquatic habitat and fisheries opportunities, primarily for exotic fish species, but native species such as hardhead may also benefit.
- The new reservoirs would affect Millerton Reservoir operations and operation of upstream reservoirs, potentially resulting in habitat impacts such as magnitude and timing of lake level fluctuations and volume and water temperature of flow releases.

2.1.4 Recreation

- Smalley Road provides access to the Bureau of Land Management's (BLM) San Joaquin River Gorge Area (formerly known as the Squaw Leap Recreation Area), and several BLM management and educational facilities:
 - Most of the recreation use in the vicinity of the K-1 Powerhouse occurs within the boundaries of the BLM's San Joaquin River Gorge Area, where paved, unpaved roads, and trails provide access for hunting, fishing, mountain biking, hiking, and equestrian use.
 - Off-road vehicle use is not allowed within the boundaries of the San Joaquin River Gorge Area.
- There are no major developed recreation facilities in the immediate vicinity of K-1, except for a Native American Village and presentations used to teach school aged children about the natural and cultural resources of the area.
- A dam located downstream of the K-1 Powerhouse would likely inundate these facilities and eliminate the activities they support depending upon the exact location of the dam. This would be considered a significant impact.

2.1.5 Cultural Resources

- The presence of a permanent water source (San Joaquin River) contributed to a diverse resource base. The riparian area formerly had salmon and other fishery resources, and diverse vegetation along the river was used for food and other purposes. Blue Oak woodland was an important resource for acorns.

- There is a high probability of prehistoric archaeological sites including BRM stations, hunting and fishing camps, and seasonal village sites.
- Numerous archaeological sites are documented in the San Joaquin River Gorge Area; BLM has proposed the area as a District on the National Register of Historic Places.
- A variety of historic archaeological sites are likely, associated with mining, logging, hydroelectric development, recreation and other activities.

2.1.6 Land Use/Mineral Resources

- K-1 is located upstream of the Millerton Lake State Recreation Area, on land managed by the Bureau of Land Management.
- Loss of hydroelectric facilities would be considered a significant impact unless mitigated by development of new facilities.

2.2 RM 286 DAM SITE

2.2.1 Botany

- This is a steep-sided canyon with exposed rock. The soil is thin over much of the area with sparse vegetation and low species diversity.
- The habitat community is foothill woodland. The dominant tree is foothill pine with scattered interior live oak. Common shrubs include California buckeye, toyon, and bush lupine. Abundant herbaceous vegetation includes ripgut brome, soft chess, ranchers fireweed, clover, wild oat, and clakia.
- Inundation at any of the three Temperance Flat dam sites (RM 274, RM 279 and RM 286) would flood much or all of the San Joaquin River between Millerton Reservoir and Kerckhoff Reservoir, with potentially adverse effects on rare-plant species including *Carpenteria californica*.
- *Carpenteria* only occurs in the San Joaquin River drainage and has relatively narrow habitat requirements. In areas with suitable habitat that have not been surveyed by botanists it should be considered to have a moderate to high probability of occurring. Other special status species occur in habitats that are more common and widespread in the area. These species, too, have a moderate to high probability of occurring in areas that have not been surveyed.

2.2.2 Wildlife

- Wildlife habitat in the vicinity of the dam site consists of generally foothill woodland, characterized by blue oak, and foothill pine.
- The habitat has a relatively open structure with a moderate to low density of understory shrubs and grasslands.
- The area is exceptionally steep walled and subtended by granitic bedrock. This steep character with a lack of dense cover probably limits the wildlife community to those species adapted to existence in such conditions, e.g., it probably precludes deer and black bear and other large mammals.

- There are potentially fewer species of special concern here than in areas of flatter terrain:
- The VELB, a federally threatened species may be present but may be limited to ephemeral stream beds confluent with the San Joaquin River.
- River habitat conditions are likely suitable for the western pond turtle. The potential for the western spadefoot toad, tiger salamander, foothill yellow-legged frog, and coast horned lizard, is probably limited due to the steep terrain.
- The terrain may provide suitable nesting areas for the American peregrine falcon, and golden eagle. Osprey and several species of bats may also inhabit this area.

2.2.3 Aquatic Biology/Water Quality

- The San Joaquin River near the RM 286 dam site runs in a low gradient, bedrock-controlled channel, forming a series of long pools separated by rock-fall debris.
- Flow in the reach near the dam site was very low at the time of the field visit and, therefore, the rock-fall debris was exposed, with much of the river flow hidden by boulders.
- Minimum required instream flow releases from Kerckhoff Dam are 25 cfs in normal years and 15 cfs in dry years. Additional releases may be required to prevent summer water temperatures in the river from falling below 27 degrees centigrade.
- A reservoir at any of the three Temperance Flat dam sites (RM 274, RM 279 and RM 286) would inundate much or all of the San Joaquin River between Millerton Reservoir and Kerckhoff Reservoir, with potentially adverse effects on American shad and striped bass and two California State Species of Special Concern, hardhead and Kern brook lamprey. A petition has been submitted to list the Kern brook lamprey under the Endangered Species Act.
- The reservoir for the RM 286 dam site would likely also inundate Kerckhoff Reservoir and the reach of the San Joaquin River between Kerckhoff Reservoir and Redinger Dam. This reach of the river, the Horseshoe Bend Reach, contains an important native fishery.
- Construction of a new or enlarged reservoir would create new aquatic habitat and fisheries opportunities, primarily for exotic fish species, but native species such as hardhead may also benefit.
- The new reservoirs would affect Millerton Reservoir operations and operation of upstream reservoirs, potentially resulting in habitat impacts such as magnitude and timing of lake level fluctuations and volume and water temperature of flow releases.

2.2.4 Recreation

- There are no developed recreation facilities in the immediate vicinity of the dam site. However, the dam site is located along a whitewater boating run referred to as the Patterson Bend run:

- This run, which extends from the base of Kerckhoff Reservoir Dam to the K-1 or K-2 Powerhouses is considered Class V at flows of about 1,500 to 5,000 cfs, flows.
- Constructing a dam at RM 286 would inundate most of this whitewater boating run, resulting in the loss of this and other river-oriented recreation opportunities. This would be considered a significant impact.

2.2.5 Cultural Resources

- The presence of a permanent water source (San Joaquin River) contributed to a diverse resource base. The riparian area formerly had salmon and other fishery resources, and diverse vegetation along the river was used for food and other purposes. Blue Oak woodland was an important resource for acorns.
- Terrain is very steep (granite walls) at the dam site itself, making resources less likely, but there is a high probability of prehistoric archaeological sites on gentler terrain upstream, including BRM stations, and hunting and fishing camps.
- Walkable slopes uphill from the dam may have a variety of ephemeral sites. Windy Gap is visible upstream from the dam site; blue oaks are indicative of potential acorn gathering areas.
- A variety of historic archaeological sites are likely, associated with mining, logging, hydroelectric development, recreation, and other activities.
- One dry-stacked rock wall, a possible game blind, was observed near the dam site.

2.2.6 Land Use/Mineral Resources

- The dam site is located within a steep gorge and is inaccessible by vehicle. It is outside the boundaries of the Millerton Lake State Recreation Area, but may be within the boundaries of the BLM's San Joaquin River Gorge Area, depending upon the exact location of the dam site.
- Access to the site is restricted. Although a quarry would be developed on site to provide construction materials, other construction activity would cause transportation and other related short-term impacts during project development.
- Inundation of this area would create a large reservoir in a pristine area with significant aesthetic value. It is likely to generate demand for development of recreational facilities connected to the reservoir and could result in development of all the associated commercial establishments typical of such facilities in similar areas. This would be considered a significant impact.
- If the development were appropriately planned and any impacts to other resource areas (aquatic and terrestrial biology and cultural resources) were properly mitigated through a comprehensive watershed management plan, this impact could be mitigated.

2.3 KERCKHOFF LAKE AND BIG CREEK NO. 4

2.3.1 Botany

- The upstream half of the reservoir is shallow, especially compared to most other reservoirs in the area. The shallow shoreline provides additional wetland habitat not common in the project area.
- Tributary streams with riparian corridors flow into Kerckhoff Reservoir. Riparian vegetation along these streams includes alder, willow and Oregon ash.
- The lower end of the reservoir is in a steep-walled canyon with a shoreline of mostly bedrock and little vegetation.
- The San Joaquin River upstream of the reservoir to Big Creek Powerhouse No. 4 has a lower gradient channel with a narrow, discontinuous band of riparian vegetation. Flows were high between the powerhouse and the lake during our field visit on June 18, 2003.
- Areas subject to inundation could have suitable habitat for special-status species.
- *Carpenteria* only occurs in the San Joaquin River drainage and has relatively narrow habitat requirements. In areas with suitable habitat that have not been surveyed by botanists it should be considered to have a moderate to high probability of occurring. Other special status species occur in habitats that are more common and widespread in the area. These species, too, have a moderate to high probability of occurring in areas that have not been surveyed.

2.3.2 Wildlife

- Wildlife habitat in the vicinity of Kerckhoff Reservoir is comprised of riparian and lacustrine-based habitats.
- The habitat around the reservoir is a mosaic of foothill woodland, chaparral and small patches of grassland.
- The area is hilly and mountainous, but not so steep as to preclude large species of wildlife such as deer and black bear. The area is probably winter range for deer.
- Cattle grazing is quite evident in the upland areas and grazing appears to have substantially altered habitat quality throughout much of the area.
- Several species of special concern are expected to occur in this area:
- The VELB, a federally threatened species is likely to be present where elderberry shrubs are present.
- The western spadefoot toad, tiger salamander, foothill yellow-legged frog, coast horned lizard, American peregrine falcon, golden eagle, osprey and several species of bats are all likely inhabitants of this area.
- The reservoir habitats probably support osprey and western pond turtles.
- The California willow flycatcher, a federally threatened species, may inhabit the willow thickets around the reservoir.

2.3.3 Aquatic Biology/Water Quality

- Kerckhoff Reservoir is about 2.5 miles long.
- The upstream half of the reservoir appears to be very shallow due to the deposition of silt and has a well-vegetated shoreline.
- The lower end of the reservoir is in a steep-walled canyon with a shoreline of mostly bedrock and little useful habitat for fish.
- The reservoir volume and flushing rate is high, so water quality is probably similar to that of the San Joaquin River upstream.
- The San Joaquin River upstream of the reservoir to Big Creek No. 4 has a low gradient channel with well-developed riparian vegetation. Flow was high at the time of the field visit, but flow upstream of the powerhouse was much lower.
- A number of unidentified fish fry were seen in a small, unnamed tributary that enters at the north shore of the Kerckhoff Reservoir. The lower several hundred feet of this creek was inundated by the reservoir at the time of the visit, forming a long, shallow pool with algae covered gravel and rock substrate. Upstream of the pool, the gradient increased and water depth decreased sharply, making the stream impassable to fish.
- A larger tributary, Fish Creek, enters the reservoir about 0.5 mile east of the unnamed tributary, but was not visited. Both streams may provide spawning habitat for hardhead and other fish in the reservoir.
- Sediments accumulating in the reservoir near the Kerckhoff Powerhouse intakes, which are at the base of Kerckhoff Dam, could contain toxic materials. Sluicing these sediments from the reservoir could affect water quality in the San Joaquin River and Millerton Reservoir.

2.3.4 Recreation

- PG&E's Smalley Cove Recreation Area is located on the north shore of Kerckhoff Lake that is accessible from Powerhouse Road (also referred to as Auberry Road or North Fork Road).
- There are no other developed recreation facilities in the immediate vicinity of Kerckhoff Lake or upstream to SCE's Big Creek No. 4 Powerhouse.
- Kerckhoff Reservoir and Smalley Cove are not heavily used but provide day use opportunities such as fishing and picnicking and overnight camping opportunities.
- A small boat launching area provides boat access to the lake and is also used as the put-in for the Patterson Bend whitewater boating run located downstream and the take-out for the Horseshoe Bend whitewater boating run, located upstream.
- There are no developed recreation facilities in the vicinity of SCE's Big Creek No. 4 Powerhouse.
- The powerhouse is situated on a run referred to as the Horseshoe Bend Run, which extends from Redinger Dam (Dam No. 7) to Kerckhoff Reservoir. This run is considered Class III with 2 Class IV+ rapids at flows ranging from 1,000 to 2,500 cfs. Difficulty of this run increases with flow.

- All of the proposed Temperance Flat Dam options would inundate Kerckhoff Lake and most or all of the Smalley Cove Recreation area. However, this would not be considered a significant impact because the opportunities currently provided by Kerckhoff Reservoir would continue to exist with a new reservoir and the existing facilities could be replaced.
- All of the proposed Temperance Flat Dam options would inundate some or all of the Horseshoe Bend run, resulting in the loss of this and other river-oriented recreation opportunities. This would be considered a significant impact.

2.3.5 Cultural Resources

- The presence of a permanent water source (San Joaquin River) contributed to a diverse resource base. The riparian area formerly had salmon and other fishery resources, and diverse vegetation along the river was used for food and other purposes. Blue Oak woodland was an important resource for acorns.
- There is a high probability of prehistoric archaeological sites on gentler terrain, including BRM stations, and hunting and fishing camps.
- Ephemeral use sites are likely in the San Joaquin River canyon around SCE's Big Creek Powerhouse No. 4.
- A known Toltichi (Yokuts) village site was formerly located in the vicinity of the Wishon Powerhouse, and there may be some remains of this village.
- Some archaeological sites are known to be inundated by the existing Kerckhoff Reservoir.
- Known historic archaeological resources are associated with the PG&E employee community at Wishon Powerhouse; various other historic sites are likely, associated with mining, logging, hydroelectric development, recreation and other activities.

2.3.6 Land Use/Mineral Resources

- Land use features consist of Kerckhoff Lake and Big Creek No. 4 Powerhouse. The Powerhouse is managed electronically without any personnel. Associated recreational activities are described above under Recreation.
- Loss of hydroelectric facilities would be considered a significant impact unless mitigated by development of new facilities.

2.4 THE RIVER BELOW REDINGER DAM, AND REDINGER LAKE

2.4.1 Botany

- This is a narrow, steep, rocky channel below dam. Little vegetation on banks, lacks riparian.
- The banks above Redinger Lake are steep and contain very little riparian vegetation (local areas of buttonwillow, willow and alder). The pool level was almost at capacity during the site visit- approx 10 feet below high water mark. The upper slopes are foothill woodland (primarily foothill pine and interior live oak).

- The Willow Creek confluence is approximately 3000 feet downstream of the dam. Willow Creek supports a riparian corridor (alder, cottonwood, willow, blackberry). Upper slopes are typical foothill woodland (primarily foothill pine and interior live oak).
- Areas of potential occurrence of rare plant species exist below the proposed inundation limit and may be affected by the project.
- *Carpenteria* only occurs in the San Joaquin River drainage and has relatively narrow habitat requirements. In areas with suitable habitat that have not been surveyed by botanists it should be considered to have a moderate to high probability of occurring. Other special status species occur in habitats that are more common and widespread in the area. These species, too, have a moderate to high probability of occurring in areas that have not been surveyed.

2.4.2 Wildlife

- The river below Redinger Lake has limited riparian habitat due to expansive areas of granitic bedrock. However, the river itself and tributaries to it, such as Willow Creek, support a population of western pond turtles.
- Foothill yellow-legged frogs were known to occur in Willow Creek in years past.
- The river may also provide habitat conditions for osprey, American peregrine falcon, golden eagles, and several sensitive bat species.
- The river supports a population of black bears and it may also provide winter range for deer.
- The upland habitat in this area is similar to that which exists around Kerckhoff Reservoir and powerhouse.

2.4.3 Aquatic Biology/Water Quality

- Redinger Reservoir is 5.25 miles long and less than 2,000 feet wide.
- The basin's steep topography results in little shallow water habitat and no significant coves.
- The reservoir volume is small relative to the amount of inflow from the San Joaquin River and the Big Creek No. 3 Powerhouse, resulting in a high flushing rate.
- Inflow is cold and nutrient-poor, which, combined with the high flushing rate and dearth of shallow water habitat, results in low reservoir fish production.
- According to past studies (SCE 1997 relicensing studies), Redinger Reservoir thermally stratifies in low but not high inflow years, while dissolved oxygen concentration is generally high and pH is slightly acidic at all depths.
- The fish fauna of Redinger Reservoir primarily consists of native species, including hardhead, a California State Species of Special Concern.
- The San Joaquin River between Redinger Dam and the Big Creek No. 4 Powerhouse, known as the Horseshoe Bend Reach, runs through a steep-sided canyon similar to the canyon below Kerckhoff Reservoir, with a low-gradient, bedrock-controlled channel that forms a series of long, deep pools and runs separated by rock-fall debris.

- Willow Creek, a major tributary that is a major source of fine sediments and warm water to the reach, joins the river about a half-mile downstream of Redinger Dam.
- Lower Willow Creek has very low surface flow which helps keep exotic species in upper Willow Creek and Bass Lake from invading Horseshoe Bend.
- Much of the natural flow of the San Joaquin River is diverted from Redinger Dam to Big Creek No. 4.
- The fish fauna of the Horseshoe Bend is mostly comprised of native species, with hardhead the most abundant species.
- The Department of Fish and Game currently manages the Horseshoe Bend Reach and Redinger Reservoir as a native species fishery.

2.4.4 Recreation

- Redinger Lake is an existing lake, which impounds water for SCE's Big Creek No. 4 Hydroelectric Project.
- The lake is located within the boundaries of the Sierra National Forest and is not heavily developed for recreation use:
 - Overnight camping is allowed in a designated area near the dam and restrooms,
 - A boat ramp and parking are available on the north shore, about 1/3 mile east of the dam.
 - Three private boat launches are located at the upstream end of the lake.
- The river between Redinger Dam (Dam No. 7) and Big Creek No. 4 Powerhouse is inaccessible by vehicle, except where an unpaved road provides access to the river near the Willow Creek confluence.
- A trail referred to as the Horseshoe Bend trail provides foot access to the area and is used by horseback riders, hikers, mountain bikers and hunters.
- The river between Redinger Lake Dam and Powerhouse is used by whitewater boaters, as explained above, and by anglers.
- A lower elevation dam at RM 286 would inundate the all of the Horseshoe Bend run, resulting in the loss of this and other river-oriented recreation opportunities. This would be considered a significant impact.
- A higher elevation dam and RM 286 would inundate all of the Horseshoe Bend Run and Redinger Reservoir. The latter would not be considered a significant impact because the opportunities currently provided by Redinger Lake would continue to exist with a new reservoir and the existing facilities could be replaced.

2.4.5 Cultural Resources

- The presence of a permanent water source (San Joaquin River) contributed to a diverse resource base. The riparian area formerly had salmon and other fishery resources, and diverse vegetation along the river was used for food and other purposes. Blue Oak woodland was an important resource for acorns.

- Numbers of archaeological sites were inundated by Redinger Lake.
- There are also known archaeological sites at Chawanakee Flats and other areas within the potential inundation area, including sites in the vicinity of Edison's Powerhouse No. 3.
- There is a high probability of prehistoric archaeological sites on gentler terrain throughout, including BRM stations, and hunting and fishing camps.
- Ephemeral use sites are likely in the San Joaquin River canyon extending downstream from Redinger Dam to SCE's Big Creek Powerhouse No. 4.
- Historic archaeological remains are expected in association with the SCE employee community at SCE's Powerhouse No. 3.
- Standing historic structures at and around SCE's Powerhouse No. 3, including the Chawanakee School, may be historically significant.
- Various other historic archaeological sites are likely, associated with mining, logging, hydroelectric development (e.g., a construction camp located near Redinger Dam), recreation and other activities.

2.4.6 Land Use/Mineral Resources

- Most of the old SCE housing has been removed but there are still some unoccupied, abandoned housing units in the area.
- Access to the site during construction would be difficult and would cause temporary disruption.
- Loss of hydroelectric facilities and potential loss of a historic facility would be considered significant impacts unless mitigated by the development of new facilities.

2.5 TEMPERANCE FLAT AND PATTERSON MINE SITES

2.5.1 Botany

- Upper Millertown Reservoir is steep sided and contains sparse foothill woodland.
- Foothill pine is the most common tree species with interior live oak, blue oak, buckeye, buckbrush, and poison oak as common shrubs.
- Riparian vegetation is minimal and confined to a few narrow drainages entering lake.
- The proposed dam sites at RM 274 and RM 279 are typical of area- steep with low plant species diversity.
- A seasonal stream tributary entering Millertown Lake supports riparian vegetation. Willow, fig, blackberry and abundant California wild grape are common. The herbaceous vegetation is weedy.
- A reservoir at the lower two Temperance Flat dam sites would inundate much or all of the San Joaquin River between Millerton Reservoir and Kerckhoff Reservoir, with potentially adverse effects on a listed plant species, *Carpenteria californica*. *Carpenteria* only occurs in the San Joaquin River drainage and has relatively narrow habitat requirements. In areas with suitable habitat that have not been surveyed by

botanists it should be considered to have a moderate to high probability of occurring. Other special status species occur in habitats that are more common and widespread in the area. These species, too, have a moderate to high probability of occurring in areas that have not been surveyed.

2.5.2 Wildlife

- The area is within part of the inundation zone for this option and is somewhat flatter, with more well developed woodlands (foothill woodland habitat) and woodland understory than the areas that would be affected by the options.
- The wildlife and list of species of special concern are likely to be quite similar to that discussed for others of the project.
- The open mine shafts and tunnel adits in this area may provide habitat for several species of sensitive bats.
- Most of the species of special concern discussed for other areas of the inundation zone are also likely in this area.

2.5.3 Aquatic Biology/Water Quality

- The shoreline in much of the portion of Millerton Reservoir that would be affected by the two lower Temperance Flat dams (at RM 274 and RM 279) is steep-sided and rocky with little vegetation.
- The shoreline near the Temperance Flat Recreation Area is gradual with many bushes and trees. This area would provide excellent fish habitat if inundated by a new reservoir.
- The reservoir water level was high at the time of the field trip and much of the shoreline aquatic habitat was out of view.
- Two small, unnamed creeks were examined in the Temperance Flat reach: one stream is on Temperance Flat in the Sullivan Mine drainage and the other is east of the Patterson Mine site.
- The creek in the Sullivan Mine drainage was densely covered with blackberry and grapes and an overstory of oaks and pines. It had too little flow to support fish.
- Smallmouth bass were observed in the cove in Millerton Reservoir at the mouth of this stream.
- The stream near Patterson Mine site had no flowing water, but the channel contained a few highly vegetated pools with many insects (water boatmen). No other aquatic habitats were seen in the area.
- A reservoir at the lower two Temperance Flat dam sites would inundate much or all of the San Joaquin River between Millerton Reservoir and Kerckhoff Reservoir, with potentially adverse effects on American shad and striped bass and two California State Species of Special Concern, hardhead and Kern brook lamprey. A petition has been submitted to list the Kern brook lamprey under the Endangered Species Act.

- Construction of the new or enlarged reservoirs would create new aquatic habitat and fisheries opportunities, primarily for exotic fish species, but native species such as hardhead may also benefit.
- The new reservoirs would affect Millerton Reservoir operations and operation of upstream reservoirs, potentially resulting in habitat impacts such as magnitude and timing of lake level fluctuations and volume and water temperature of flow releases.
- PH tests of standing water present in the mine Sullivan Mine tunnels indicate the water is slightly basic (7.8). There has been some concern that mercury may have been used in the gold mining and recovery process. However, a Bureau of Reclamation geologist informally collected soil samples in the area and did not observe any free mercury.
- Inundation of the Sullivan and Patterson mines is not expected to result in significant impacts to water quality. This conclusion is based on several factors: 1) field evidence along with published literature suggest the mines were very small; 2) there are few, if any, minerals present that would cause metals contamination; and 3) there are few, if any, sulfide minerals present that would cause acidic conditions. It may be useful to collect soil samples for laboratory analysis to either confirm or refute the presence of mercury.

2.5.4 Recreation

- The area referred to as Temperance Flat is located on private land, outside the boundaries of the Millerton Lake Recreation Area and the BLM's San Joaquin River Gorge Area.
- Remnants of the Sullivan Mine, a historic gold mine, are present but mostly covered by brush.
- A pit or vault toilet is located just to the west of Temperance Flat, on the eastern edge of BLM land.
- A boat in camp and the Hewitt Valley Environmental Camp are located across the lake from Temperance Flat.
- Temperance Flat is not heavily used for recreation owing to the absence of facilities and the dry, rugged terrain. Inundation of the Temperance Flat area would not be considered a significant impact because the opportunities currently provided would continue to exist with a new reservoir and the existing facilities could be replaced.
- The Sullivan Mine remnants are not considered significant for recreational purposes. The two mine tunnels are currently open and may be considered public safety hazards.

2.5.5 Cultural Resources

- The presence of a permanent water source (San Joaquin River) contributed to a diverse resource base. The riparian area formerly had salmon and other fishery resources, and diverse vegetation along the river was used for food and other purposes. Blue Oak woodland was an important resource for acorns.

- Some sites are inundated by the existing Millerton Lake reservoir.
- There remains a high probability of prehistoric archaeological sites on gentler terrain, including BRM stations, and hunting and fishing camps.
- Historic archaeological resources are abundant in the area.
- There are fairly diverse mining features on the south (Fresno County) side of the river, around Temperance Flat; these include remains from Chinese placer mining, an arrastra, and two mine portals associated with the Sullivan Mine.
- On the north (Madera County) side of the river, the Patterson Mine presents an exceptionally diverse set of remains, including an arrastra, mine portals, remains of cabins, and can/equipment dumps. This area was formerly used for public interpretation of mining history, by the California Department of Parks and Recreation; the site is likely to be found eligible to the National Register of Historic Places.
- A two-stamp lift wheel and various other mining remains, including a ball mill, an ore car and rail tracks, are present near a contemporary cabin on the north side of the river a short distance upstream from the Patterson Mine.

2.5.6 Land Use/Mineral Resources

- Temperance Flat, located on the south side of the upper end of Millerton Reservoir is undeveloped.
- An unpaved road provides access from Wellbarn Road.
- Remnants of an historic gold mine, the Sullivan Mine, are present but mostly hidden by brush. Remnants include two partially collapsed mine tunnels, small tailings piles, arrastras (see photos in Attachment E), and hand stacked walls.
- The Patterson Mine, also an historic gold mine, is located across the lake, about 1.5 miles downstream. Remnants of the Patterson Mine include several mine tunnels, a well preserved arrastra, small tailings piles, and a small stamp mill foundation. A cabin and stamp mill are located upstream and upslope, but it is unclear whether these features are part of the Patterson Mine or another historic mining operation.
- The Division of Mines and Geology' Bulletin 193, Gold Districts of California, indicates that gold mining began in the Temperance Flat area in the mid-1800s. According to Bulletin 193, lode mining began at the Sullivan mine in 1853 and continued intermittently until about 1915. The area was prospected again during the 1930's. The Sullivan mine produced about \$100,000 of gold. Bulletin 193 does not contain any information about the Patterson Mine.
- The rock types, mineralogy and mine remnants observed in the field are consistent with the information contained in Bulletin 193. The main rock types are granite or granodiorite, which are not extensively altered. Small quartz veins and boulders are present at the tunnel entrances, suggesting the gold was present in quartz veins.
- No sulfide, arsenic or copper minerals were observed in either the tunnel entrances or tailings piles at either mine, although Bulletin 193 indicates pyrite was often abundant.

- Both the Sullivan and Patterson mines appear to be relatively small mining operations as suggested by the very small tailings piles, relatively short tunnels and absence of extensive mineralization or alteration of the host rock.

2.6 FINE GOLD CREEK AND DAM SITE

This section of report deleted from Temperance Flat Reservoir TM, but included in Fine Gold Reservoir TM.

ATTACHMENT A

*Kerckhoff Hydroelectric Generating Facilities
Trip Logs and Photos*

Field Trip Log - Aquatic		
Trip Log Number:	1	Project No: 1003811.010101
Dates:	6/17/03	
Site Name:	Kerckhoff Powerhouse No. 1	
Location:	San Joaquin River, at uppermost end of Millerton Reservoir	
Prepared By:	Phil Unger	
Date:	July 10, 2003	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	San Joaquin River Canyon downstream of Kerckhoff Power Plant No. 1
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	

Field Observations:

Existing Facilities:

Existing facilities include Kerckhoff Power Plant No. 1 and associated structures, a footbridge over the San Joaquin River and a footpath from Smalley Road to the bridge.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

The San Joaquin River between Kerckhoff Dam and Millerton Reservoir flows in a deeply incised low-gradient bedrock-controlled channel, forming a series of long pools separated by rock-fall debris. At higher flows, the rock-fall debris may be inundated, forming boulder-strewn run habitat. The reach of the river at the site downstream of the Kerckhoff Power Plant No. 1 had a high flow at the time of the field visit, which indicates that this power plant was operating (flow upstream of the power plant was much lower). Normally, the Kerckhoff Power Plant No. 1 operates only during high flow periods and during May 15 through June 30. The May – June flows are to enhance spawning conditions for American shad from Millerton Lake.

Need for additional (engineering/hydrological, or other) information on measures

Need surface area vs. elevation projections for proposed Temperance Flat Reservoirs (for both RM 274 and RM 279), and monthly reservoir surface area projections for different water year types.

Also need information on how operation of new reservoir would affect operation of Millerton Reservoir, upstream reservoirs and river flows.

Additional data needs (within each specific discipline)

Need the following information:

Information on American shad and striped bass spawning runs in the San Joaquin River upstream of Millerton Reservoir.

Information on abundance and distribution of hardhead, Kern brook lamprey and other fish species in (or potentially in) the San Joaquin River upstream of Millerton Reservoir.

Projected water temperature and dissolved oxygen regimes in new reservoirs for different seasons and water surface elevations.

Field Trip Log – Cultural Resources		
Trip Log Number:	1	Project No: 1003811.010101
Dates:	6/17/03	
Site Name:	Kerckhoff Powerhouse No. 2	
Location:	San Joaquin River, at uppermost end of Millerton Reservoir	
Prepared By:	David White	
Date:	June 17, 2003	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	San Joaquin River Canyon downstream of Kerckhoff Power Plant No. 1
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	Millerton Lake East

Field Observations:

Existing Facilities:

PG&E Kerckhoff Powerhouse No. 2, substation, surge chamber, transmission line and other associated facilities would be inundated by either 1200' or 1300' pool; BLM Squaw Leap interpretive facilities, including a reconstructed "Indian Village" would likewise be inundated; BLM foot trail and suspension footbridge would be inundated.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Prehistoric: Blue Oak/Foothill Pines vegetation along the San Joaquin River would have presented diverse natural resources. High probability of prehistoric archaeological sites including BRM stations, hunting & fishing camps. Numerous archaeological sites are documented in the Squaw Leap area; BLM has proposed the area as a District on the National Register of Historic Places.

Historic: Various sites likely, associated with mining, logging, hydroelectric development, recreation and other activities.

Need for additional (engineering/hydrological, or other) information on measures

Need footprint of all associated project-related ground disturbance areas, to include but not be limited to project offices and maintenance buildings, construction set-up and lay-down areas, access roads, electric transmission lines, water conveyance structures, and all other project facilities.

Additional data needs (within each specific discipline)

Need archaeological records search with California Historic Resources Inventory System (CHRIS) information center. Clearinghouse: Southern San Joaquin Valley Info Center, CSU-Bakersfield.

Need consultation with the BuRec cultural resource specialist regarding sites that may not be recorded with the CHRIS information center; also need consultation with BLM cultural resource specialists regarding Squaw Leap nomination as District to the National Register of Historic Places.

Also need brief review of archaeological and ethnographic literature pertaining to the area. Minimal level of effort: 1) to identify types of archaeological remains expected, time periods represented; and 2) to identify Native American tribes historically occupying the area, along with published information on major named villages or other ethnographic sites.

Field Trip Log – Recreation KR-1		
Trip Log Number:	1	Project No: 1003811.010101
Dates:	6/17/03	
Site Name:	Kerckhoff Powerhouse No. 1	
Location:	San Joaquin River, at uppermost end of Millerton Reservoir	
Prepared By:	Sandra Walter-Perry	
Date:	July 15, 2003	

Weather Conditions:	Sunny and hot	
Areas Covered (attach map with notations)	Upper end of Millerton Reservoir, BLM San Joaquin Gorge Area (formerly Squaw Leap Recreation Area)	
Attachments		
Photo Log	None	
Photos	None	
Topographic Map(s)	Excerpts from USGS 7.5 minute quad, Millerton Lake East	

Field Observations:

Existing Facilities:

PG&E's Kerckhoff No. 1 PH (K-1) and other appurtenant structures. A footbridge crossing the San Joaquin River is located immediately downstream of the tailrace. K-1 is accessed via Smalley Road, which also provides access to PG&E's Kerckhoff No. 2 PH (K-2) and associated facilities.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

K-1 is situated upstream of the Millerton Lake State Recreation Area, on land managed by the BLM. The BLM land is managed as part of the San Joaquin River Gorge Area (formerly, Squaw Leap Recreation area). Smalley Road traverses a portion of the San Joaquin River Area and provides access to K-1, K-2, a gaging station, a primitive camping area situated on BLM land, and BLM management and educational facilities associated with the San Joaquin River Gorge Area.

Need for additional (engineering/hydrological, or other) information on measures

None at present.

Additional data needs (within each specific discipline)

More information about the BLM's "Hands on the Land" program, an educational program, which utilizes the facilities located within the San Joaquin River Gorge Area to teach children about local Native American history.

Recreation visitor data to better understand use levels associated with various recreation activities that occur in the area (e.g. use levels associated with Hands on the Land program, use associated with dispersed activities such as hunting, horseback riding, and mountain biking).

Information and alignment maps for the San Joaquin River Trail.

Field Trip Log – Recreation KR-2		
Trip Log Number:	1	Project No: 1003811.010101
Dates:	6/17/03	
Site Name:	Kerckhoff Powerhouse No. 2	
Location:	San Joaquin River, at uppermost end of Millerton Reservoir	
Prepared By:	Sandra Walter-Perry	
Date:	July 15, 2003	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	San Joaquin River Canyon downstream of Kerckhoff Power Plant No. 1
Attachments	
Photo Log	None
Photos	None
Topographic Map(s)	Millerton Lake East

Field Observations:

Existing Facilities:

PG&E's Kerckhoff No. 2 Powerhouse (K-2), which is an underground facility and other appurtenant structures including a gaging station and substation. K-2 is accessed via Smalley Road, which also provides access to PG&E's Kerckhoff No. 1 Powerhouse (K-1) and associated facilities.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

K-2 is situated on a private parcel of land (possibly PG&E land), situated at the upper end of Millerton Lake, within the boundaries of the Millerton Lake State Recreation Area. The private parcel is surrounded by BLM land, most of which is managed as part of the San Joaquin River Gorge Area (formerly, Squaw Leap Recreation area). Smalley Road traverses a portion of the San Joaquin River Area and provides access to K-2, K-1, a gaging station, a primitive camping area situated on BLM land, and BLM management and educational facilities associated with the San Joaquin River Gorge Area.

Need for additional (engineering/hydrological, or other) information on measures

None at present.

Additional data needs (within each specific discipline)

More information about the BLM's "Hands on the Land" program, an educational program, which utilizes the facilities located within the San Joaquin River Gorge Area to teach children about local Native American history.

Recreation visitor data to better understand use levels associated with various recreation activities that occur in the area (e.g. use levels associated with Hands on the Land program, use associated with dispersed activities such as hunting, horseback riding, and mountain biking).

Information and alignment maps for the San Joaquin River Trail.

Field Trip Log - Wildlife		
Trip Log Number:	1	Project No: 1003811.010101
Dates:	6/17/03	
Site Name:	Kerckhoff Powerhouse No. 2	
Location:	San Joaquin River, at uppermost end of Millerton Reservoir	
Prepared By:	David Stevens	
Date:	July 15, 2003	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations)	San Joaquin River Canyon downstream of Kerckhoff Power Plant No. 1
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	

Field Observations:

Existing Facilities:

Kerckhoff Reservoir, including dam and Wishon Powerhouse, Kerckhoff No. 1 and No. 2 Powerhouses (PG&E), Big Creek No. 4 Powerhouse (SCE).

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Kerckhoff Reservoir is a moderate sized impoundment that provide a lacustrine habitat and setting in the relatively dry, hot lower San Joaquin watershed. The reservoir is surrounded by relatively lush riparian habitat that provides a rather well developed mesic habitat structure for wildlife. This contrasts to the more xeric habitats of the foothill woodland habitat surrounding the reservoir. The San Joaquin River in the subject reach has only limited riparian habitat as the river basin has a great deal of exposed bedrock. This section of the project area varies between moderately steep hillside and very steep, nearly vertical areas that have limited soil overburden and limited wildlife habitat. The flatter areas host small ranches where cattle range cattle grazing has seriously affected the quality of the wildlife habitat. This area may provide winter range for resident deer and may support the following sensitive species: tiger salamanders, western spadefoot toads, western pond turtles, southwestern willow flycatcher.

Need for additional (engineering/hydrological, or other) information on measures

Reservoir lever vs. surrounding terrain.
Seasonal lake level changes expected.
Project wet and dry year reservoir operations.
Minimum and maximum pool for reservoir.

Additional data needs (within each specific discipline)

Status of resident deer herd and conditions affecting status.
Status of game animal populations in the area and conditions affecting status.
State and federal special status species known to inhabit area.
Status of special status species in project area and factors affecting status.
Present threats to wildlife habitat, wildlife and special status species.
Status of wildlife and wildlife habitats in tributary streams that feed into the project area.



Above: Wickiup at “Indian Village” (BLM San Joaquin River Gorge Area interpretive center) (afternoon). (P617006.JPG)



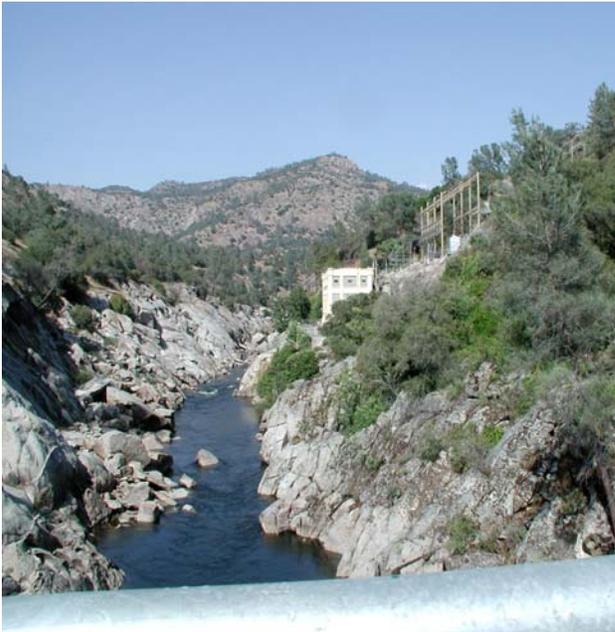
Above: Wickiup at “Indian Village” near BLM station (June 17, 2003, late afternoon) (024_21.JPG)



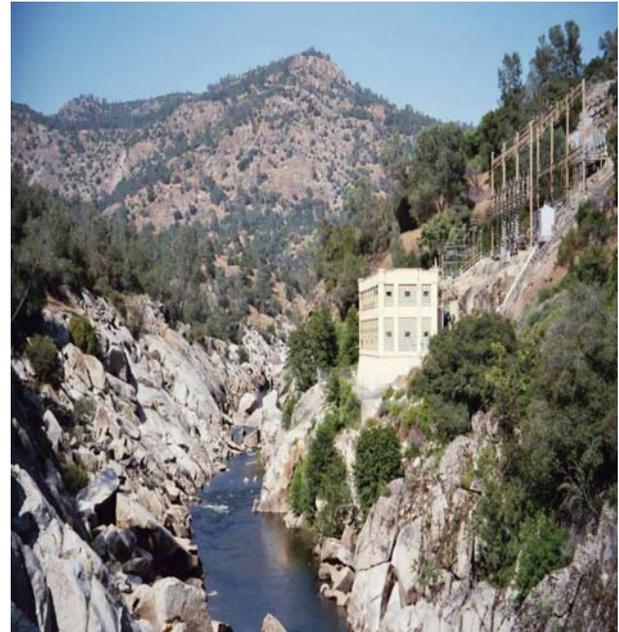
Above: Wickiup at “Indian Village” (BLM San Joaquin River Gorge Area interpretive center) (afternoon). (P617005.JPG)



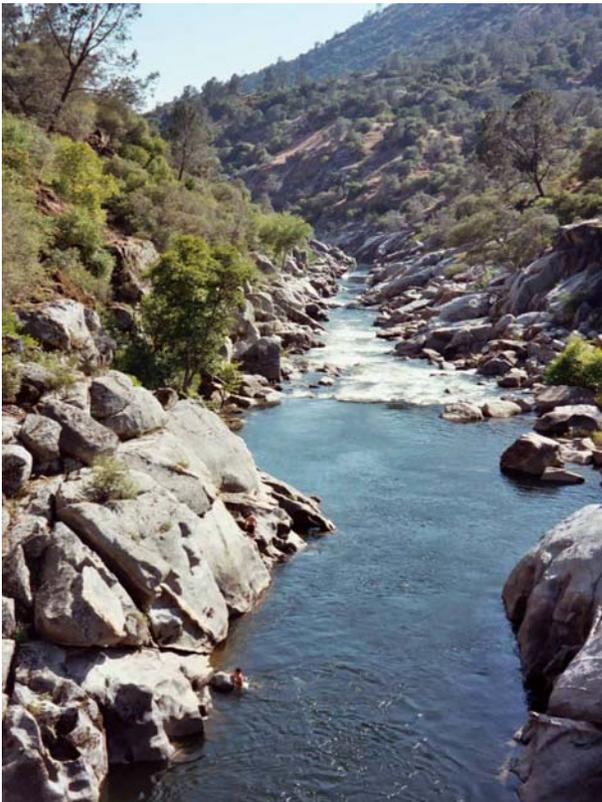
Above: Granary and ramadas at “Indian Village” (BLM San Joaquin River Gorge Area interpretive center) (afternoon). (P617007.JPG)



Above: Kerckhoff Powerhouse No. 1, view upstream from BLM bridge (afternoon). (P617012.JPG)



Above: Kerckhoff Powerhouse No.1 on San Joaquin River (view upstream, June 17 2003, late afternoon) (026_23.JPG)



Left: San Joaquin River downstream of Kerckhoff Powerhouse No.1 (view downstream, June 17 2003, late afternoon) (025_22.JPG)

ATTACHMENT B

*RM 286 Dam Site
Trip Logs and Photos*

Field Trip Log - Aquatic	
Trip Log Number:	2
	Project No: 1003811.010101
Dates:	June 18, 2003
Site Name:	RM 286 Dam Site
Location:	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Prepared By:	Phil Unger
Date:	July 10, 2003

Weather Conditions:	Sunny and mild
Areas Covered (attach map with notations)	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

Existing facilities include Audit No. 2, cut deep into granite to access Kerckhoff Powerhouse penstock, and narrow dirt road.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

The San Joaquin River between Kerckhoff Dam and Powerhouse No. 1 flows in a low-gradient bedrock-controlled channel, forming a series of long pools separated by rock-fall debris. The reach of the river at the site upstream of the Kerckhoff Power Plant No. 1 had very low flow at the time of the field visit. Minimum required instream flow releases from Kerckhoff Dam are 25 cfs in normal years and 15 cfs in dry years. Additional releases may be required to prevent summer water temperatures in the river from falling below 27° centigrade.

Need for additional (engineering/hydrological, or other) information on measures

Need information on outlet depth of new dam, locations and types of storage releases, and project volumes of water released by month and water year type.

Need surface area vs. elevation projections for proposed Temperance Flat Reservoirs (RM 274, RM 279 and RM 286 dams), and monthly reservoir surface area projections for different water year types.

Also, need information on how operation of new reservoir would affect operation of Millerton Reservoir, upstream reservoirs and river flows.

Additional data needs (within each specific discipline)

Need the following information:

Information on American shad and striped bass spawning runs in the San Joaquin River upstream of Millerton Reservoir.

Information on abundance and distribution of hardhead, Kern brook lamprey and other fish species in (or potentially in) the San Joaquin River upstream of Millerton Reservoir.

Projected water temperature regime in new reservoirs for different seasons and water surface elevations.

Field Trip Log - Biology	
Trip Log Number:	2
Project No:	1003811.010101
Dates:	June 18, 2003
Site Name:	RM 286 Dam Site
Location:	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Prepared By:	David Stevens
Date:	July 18, 2003

Weather Conditions:	Sunny and mild
Areas Covered (attach map with notations)	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Attachments	No
Photo Log	
Photos	
Topographic Map(s)	

Field Observations:

Existing Facilities:

Unimproved dirt access roads, tunnel adits.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Dam site 286 is located in a steep walled canyon along the San Joaquin River. The canyon has near vertical slopes, much of which consists of exposed granitic bedrock. Where slopes permit, soils are thin and support only limited foothill woodland vegetation characterized by blue oaks and foothill pines. There is only limited and sparse riparian habitat along the river due to bedrock formations. Habitats for wildlife in this area are xeric and sparse. The area is too steep and has too limited habitat to support populations of large animals such as deer and bear. Most wildlife in the area will likely be limited to small species that have small home ranges so they do not have to contend with the topographic rigors. Species of special concern are likely to be limited in this reach of the river, but western pond turtles may be present.

Need for additional (engineering/hydrological, or other) information on measures

Model of potential reservoir operations.
Wet and dry year reservoir levels.
Calculations of habitat loss.

Additional data needs (within each specific discipline)

Status of wildlife populations in the area.
Known populations of special status species for this reach.
Factors affecting status of special status and game populations.
Biological data from tributary streams to this reach.

Field Trip Log - Botany	
Trip Log Number:	2
Project No:	1003811.010101
Dates:	June 18, 2003
Site Name:	RM 286 Dam Site
Location:	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Prepared By:	Jeff Glazner
Date:	July 25, 2003

Weather Conditions:	Sunny and mild
Areas Covered (attach map with notations)	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

Existing facilities include Adit No. 2, cut deep into granite to access Kerckhoff Powerhouse penstock, and narrow dirt road.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Steep sided canyon with exposed rock. Soil thin over much of area with poor vegetation growing conditions. Habitat community is “foothill pine woodland.” Dominant tree is foothill pine with lesser interior live oak. Common shrubs include California buckeye, toyon, and bush lupine. Abundant herbaceous vegetation includes ripgut brome, soft chess, ranchers fireweed, clover, wild oat, and clakia.

Need for additional (engineering/hydrological, or other) information on measures

Additional data needs (within each specific discipline)

Need to locate any additional information on presence or absence of rare plant species in area.

Field Trip Log - Cultural		
Trip Log Number:	2	Project No: 1003811.010101
Dates:	June 18, 2003	
Site Name:	RM 286 Dam Site	
Location:	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).	
Prepared By:	David White	
Date:	June 18, 2003	

Weather Conditions:	Sunny and mild
Areas Covered (attach map with notations)	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	Millerton Lake East

Field Observations:

Existing Facilities:

None observed at potential dam site but pool at 1400, 1500 or 1600' would inundate PG&E's A.G. Wishon Powerhouse (see Log No. 3, Kerckhoff Lake and Big Creek No. 4).

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Prehistoric: Blue Oak/Foothill Pines vegetation along the San Joaquin River would have presented diverse natural resources. Terrain is very steep (granite walls) at the dam site itself, making resources less likely, but there is a high probability of prehistoric archaeological sites on gentler terrain upstream, including BRM stations, hunting & fishing camps. Walkable slopes uphill from the dam may have a variety of ephemeral sites. Windy Gap is visible upstream from the dam site; blue oaks are indicative of potential acorn gathering areas.

Historic: Various sites likely, associated with mining, logging, hydroelectric development, recreation and other activities. One dry-stacked rock wall, a possible game blind, was observed near the dam site.

Need for additional (engineering/hydrological, or other) information on measures

Need footprint of all associated project-related ground disturbance areas, to include but not be limited to project offices and maintenance buildings, construction set-up and lay-down areas, access roads, electric transmission lines, water conveyance structures, and all other project facilities.

Additional data needs (within each specific discipline)

Need archaeological records search with California Historic Resources Inventory System (CHRIS) information center. Clearinghouse: Southern San Joaquin Valley Info Center, CSU-Bakersfield.

Need consultation with BuRec, BLM and USFS (Sierra NF) cultural resource specialists regarding sites that may not be recorded with the CHRIS information center.

Also need brief review of archaeological and ethnographic literature pertaining to the area. Minimal level of effort: 1) to identify types of archaeological remains expected, time periods represented; and 2) to identify Native American tribes historically occupying the area, along with published information on major named villages or other ethnographic sites.

Field Trip Log - Recreation		
Trip Log Number:	2	Project No: 1003811.010101
Dates:	June 18, 2003	
Site Name:	RM 286 Dam Site	
Location:	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).	
Prepared By:	Sandra Walter-Perry	
Date:	July 15, 2003	

Weather Conditions:	Sunny and mild
Areas Covered (attach map with notations)	San Joaquin River Canyon at River Mile 286 (downstream of Kerckhoff Dam and upstream of Kerckhoff Powerhouse No. 1).
Attachments	
Photo Log	None
Photos	None
Topographic Map(s)	Excerpts from USGS 7.5 minute quad, Millerton Lake East

Field Observations:

Existing Facilities:

None

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

The RM 286 dam site is situated on the San Joaquin River, about 1.5 miles upstream of the K-1 PH. The actual dam site is located in a steep gorge and is inaccessible by vehicle. We viewed the site from an upslope location at the end of an unpaved road leading off of Smalley Road (see map). The RM 286 dam site is located outside the boundaries of the Millerton Lake State recreation area, but may be located on the north-eastern margin of the BLM's San Joaquin River Gorge Area (formerly Squaw Leap Recreation Area), depending upon the exact dam location.

There are no developed recreation facilities in the immediate vicinity, but the dam site lies within a whitewater boating run referred to as the Patterson Bend Run.

Need for additional (engineering/hydrological, or other) information on measures

Exact location of dam to determine whether it lies within the boundaries of the BLM's San Joaquin River Gorge Management Area.

Historic flow data to determine approximately how often the Patterson Bend run has been boatable in the past.

Additional data needs (within each specific discipline)

Information and alignment maps for the San Joaquin River Trail.

Whitewater boating use data, if available. We may have to rely on anecdotal information available from local paddling groups (e.g. San Joaquin Paddlers, Gold Country Paddlers)

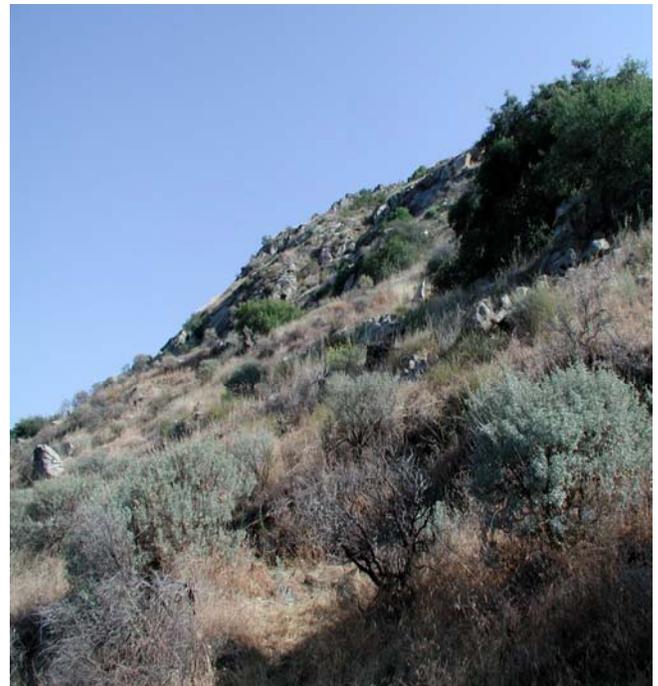
May need to conduct a boating flow study to determine minimum and optimum boating flows, depending on the level of interest by the boating community.



Above: Dam site at RM 286; view north from jeep trail in NE ¼ Sect. 2, T10S, R22E (early morning). (P6180014.JPG)



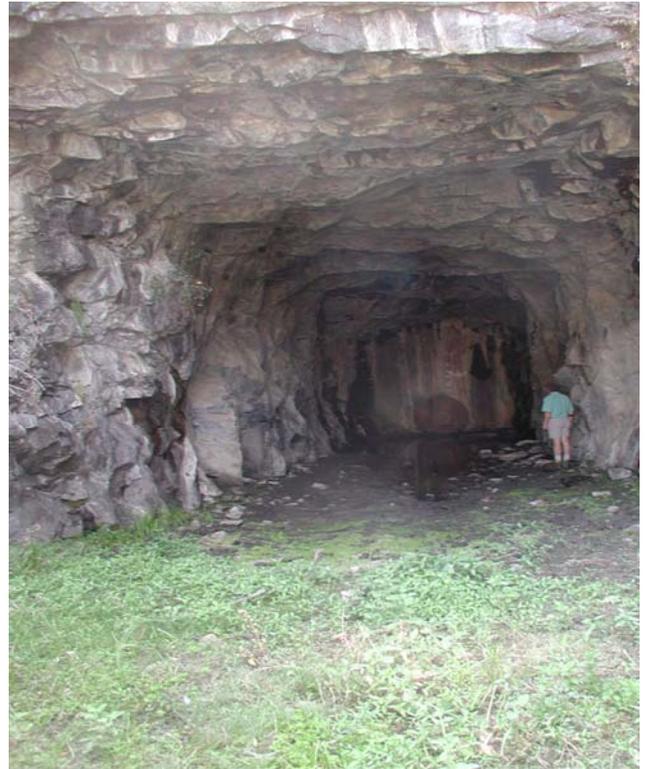
Above: Dam site at RM 286; view NNW from end of jeep trail in NE ¼ Sect. 2, T10S, R22E (early morning). (P6180015.JPG)



Above: Dry stacked rocks (game blind?), view NE from end of jeep trail in NE ¼ Sect. 2, T10S, R22E (early morning). (P6180016.JPG)



Above: Entrance to Adit #1 in NW ¼ Sect. 2, T10S, R22E (early morning). (P6180017.JPG)



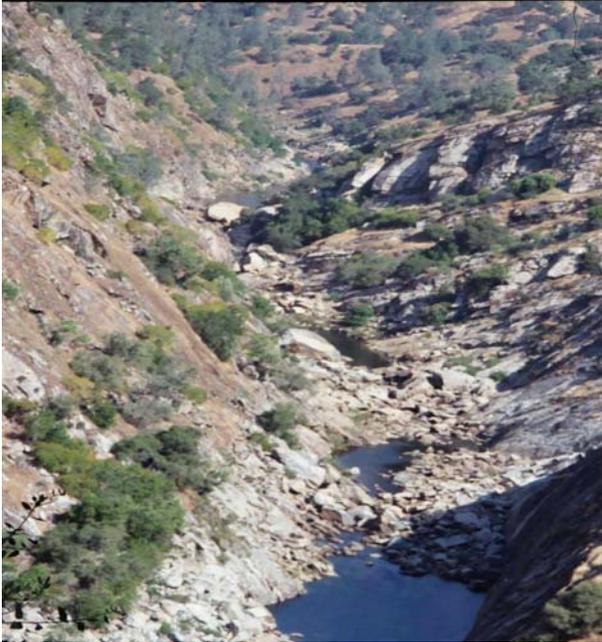
Above: Entrance to Adit #1 in NW ¼ Sect. 2, T10S, R22E (mid-morning). (P6180018.JPG)



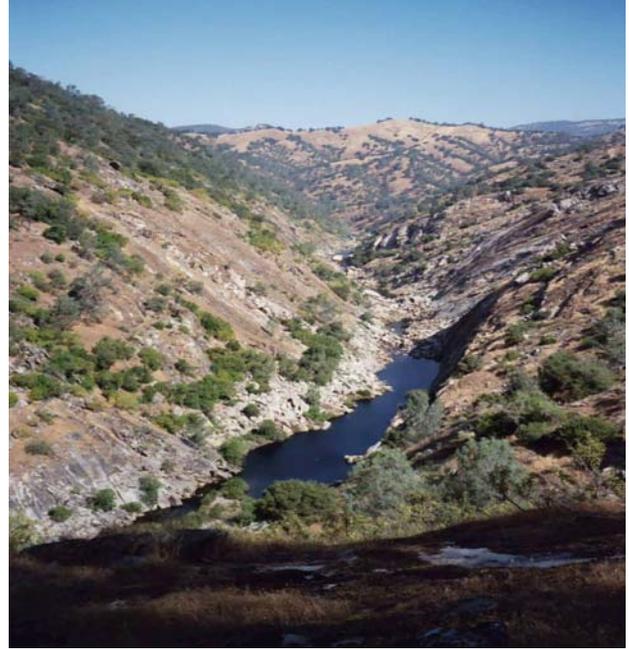
Above: Closer view of entrance to Adit #1 in NW ¼ Sect. 2, T10S, R22E (mid-morning). (P6180019.JPG)



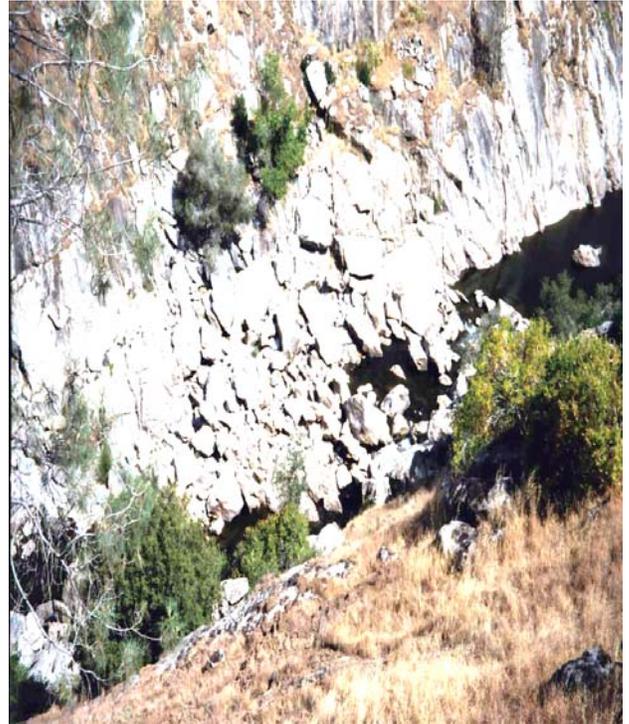
Above: Western Screech Owl perched on metal bar at rear of Adit #1 in NW ¼ Sect. 2, T10S, R22E (mid-morning). (P6180020.JPG)



Above: San Joaquin River, RM 286 dam site
(view upstream, closeup, June 18 2003)
(004_1.JPG)



Above: San Joaquin River, RM 286 dam site
(view upstream, June 18 2003) (005_2.JPG)



Above: San Joaquin River downstream of RM
286 dam site (view downstream, June 18 2003)
(007_4.JPG)



Above: San Joaquin River downstream of RM 286 dam site, showing extreme flood scour line (view downstream, June 18 2003) (008_5.JPG)



Above: Kerckhoff flow line Audit 2 near RM 286 dam site (008_5.JPG)



Above: San Joaquin River, RM 286 dam site (view upstream, June 18 2003) (018.JPG)