

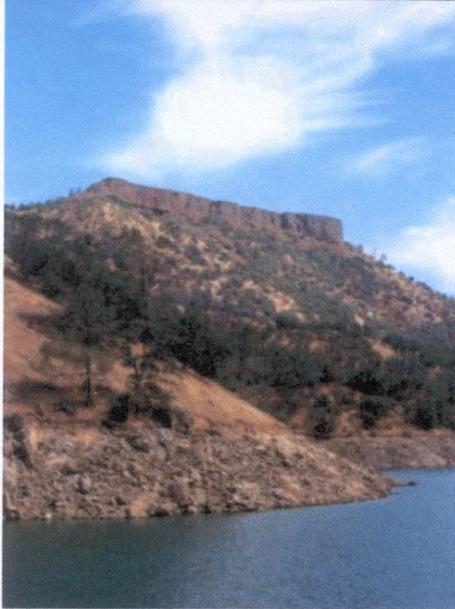
## **APPENDIX A.2**

### **Reclamation Field Trip Report**

**(June 12-14, 2002)**



# Upper San Joaquin River Storage Investigation Field Trip Logs



**August 2002**

**Prepared By U.S. Bureau of Reclamation  
Mid-Pacific Regional Office - Sacramento, California and  
Technical Service Center - Denver, Colorado**



Bureau of Reclamation personnel from the Mid-Pacific Region, Sacramento, California, and the Technical Services Center, Denver, Colorado prepared this report. This report contains three attachments as follows:

ATTACHMENT 1 - General Information and Field Trip Log for Temperance Flat Damsites, i.e. River Mile (RM) 274 (a.k.a. Mile Post (MP) 274), RM 279 (a.k.a. MP 279), and RM280 (a.k.a. MP 280).

ATTACHMENT 2 - Figures 3 – 5.

ATTACHMENT 3 - Photographs 5 –18, 27 – 28.

Note: This page has been modified from the original provided by Reclamation to reflect the exclusion of materials pertaining specifically to Fine Gold Damsite and Friant Dam Raise, which are contained in the appendices of their respective Technical Memoranda.

# **ATTACHMENT 1**

## **General Information and Field Trip Logs**

## ATTACHMENT 1 – GENERAL INFORMATION AND FIELD TRIP LOGS

### Site Review - Temperance Flat and Fine Gold Damsites, and Friant Dam Raise

#### Reclamation Inspection Team

<u>Name</u>	<u>Title</u>	<u>Location</u>	<u>Phone Number</u>
Clarence Duster	Civil Engineer	Denver, CO	(303) 445-2993
Gary Turlington	Geologist	Denver, CO	(303) 445-3203
Steve Higinbotham	Civil Engineer	Denver, CO	(303) 445-2491
Greg Mongano	Geologist	Sacramento, CA	(916) 978-5331
Joel Sturm	Geologist	Sacramento, CA	(916) 978-5305

#### Field Trip Itinerary

- 6/12: The inspection team participated in a boat trip to the three Temperance Flat Damsites (MP 274, MP 279, and MP 280), Fine Gold Damsite and Millerton Lake. The boat, provided by California State Parks, carried 21 passengers from California DWR, Montgomery, Watson, Harza Engineers and Reclamation. The inspection team also inspected the crest of Friant Dam and traveled to Wishon Powerhouse (upstream end of Kerckhoff Lake), and Kerckhoff Powerhouses No. 1 and No. 2.
- 6/13: The inspection team drove to Temperance Flat and hiked to the left abutments of MP 279 Damsite and MP 280 Damsite (located about 1 mi. upstream of MP 279 Damsite) and drove to Fine Gold Recreation area (located about 1 mi. downstream of MP 274 Damsite) via Sky Harbor Dr.
- 6/14: The inspection team drove to the upper right abutment of Fine Gold Damsite and drove through the Fine Gold Reservoir area via Road 210. The team briefly stopped at the Vulcan aggregate pit and plant located in the San Joaquin River channel, about 1 mi. downstream of Friant Dam.

#### Weather Conditions

Warm to hot and clear. Daily highs in the mid- to upper-90s.

#### Friant Reservoir (Millerton Lake) Conditions on June 12, 2002

Water Surface: El. 573.8 (Max water surface: El. 580)  
Reservoir Volume: 501,022 acre-feet (Max capacity: 520,000 a-f)  
Inflow: 2,901 cubic feet per second (cfs)

### General Right of Way/Access Restrictions

The majority of the travel during the June 12-14, 2002 field trip was on paved or well maintained dirt public roads and trails. All roads traveled were passable to two-wheel drive vehicles. The use of private roads and crossing of private property was only required to access the two Kerckhoff Powerplants. Information on specific private roads, access restrictions and owner contacts is described separately in the Access Route section for each feature. Future fieldwork will require that formal requests for Right of Entry (ROE) be made.

### General Comments on Materials/Aggregate Suppliers

The inspection team briefly visited one aggregate processing operation, Vulcan aggregate pit and plant located in the San Joaquin River channel, about 1 mi. downstream of Friant Dam. Based on discussions with the operator, the following information on local sand and gravel processing operations are provided:

The Vulcan pit has 2 to 3 years of materials remaining under current permitting. Application for new permits that would allow deeper (35 feet) excavation has been submitted. Without approval of the new permits, Vulcan could cease operations in 2 to 3 years. Several sand and gravel operations in the Fresno area have ceased operation the past two years due to permit restrictions. Vulcan knows of only one operation in the area that crushes rock to make concrete aggregate.

### Miscellaneous Contacts

<u>Name</u>	<u>Agency</u>	<u>Title</u>	<u>Location</u>	<u>Phone Number</u>
Gerry Pretzer	USBR	Operator	Friant Dam	(559) 822-2211
Tony Buelna	USBR	Sup.Civil Eng.	Fresno, CA	(559) 487-5117
Bob Epperson	USBR	Realty Spec.	Fresno, CA	(559) 487-5408
Paul Linderman	PG&E	Hydraulic Struct.	Auberry, CA	(559) 855-6007
Ted Jackson	CA State Parks	Dist. Super.	Millerton Lake	(559) 822-2332
Kevin Forester	CA State Parks	Chief Ranger	Millerton Lake	(559) 822-2332
Tom Christensen	Millerton Marina	Manager	Millerton Lake Marina	(559) 822-2264
Dave Johnson	BLM	Ranger	Kerckhoff No. 2	



## Field Trip Log

<b>Trip Log Number:</b>		<b>Project No.:</b>	
<b>Dates:</b>	June 12-13, 2002	<b>Times:</b>	
<b>Site Name:</b>	Temperance Flat	<b>Location:</b>	
<b>Prepared By:</b>	U. S. Bureau of Reclamation	<b>Reviewed By:</b>	
<b>Date:</b>	June 17, 2002	<b>Date:</b>	

Attendees/Visitors Name	Organization/Phone/Email
Clarence Duster, Civil Engineer	TSC, Denver, CO 303-445-2993
Steve Higinbotham, Civil Engineer	TSC, Denver, CO 303-445-2491
Joel Sturm, Geologist	MP Region, Sacramento, CA 916-978-5305
Gary Turlington, Geologist	TSC, Denver, CO 303-445-3203
Greg Mongano, Geologist	MP Region, Sacramento, CA 916-978-5331

**Weather Conditions:**

Warm to hot and clear. Daily highs in the mid to upper 90s.

**Access Route (attach map):**

See **Attachment 2 – Figure 1** for site locations and access routes.

### MP 274 DAMSITE (LOWER TEMPERANCE FLAT)

#### Site Access - Left Abutment

- From Hwy 99, exit at Hwy 41 North
- 8 mi. north on Hwy 41 to Friant Rd. exit
- 12 mi. northeast on Friant Rd. to Millerton Rd.
- Right (east) on Millerton Rd., 4 mi. east to Sky Harbor Dr.
- Left (north) on Sky Harbor Dr., 5.5 mi. north-northwest to Fine Gold Recreation Area (end of road and trailhead, no vehicle access beyond this point). Sky Harbor Dr. runs past the Table Mountain Casino and tribal headquarters of the Mono-Chuckchancy Tribe and past numerous private residences located in the community of Sky Harbor Estates.
- 1 mi. on hiking trail to left abutment. Lower abutment slopes are very steep and inaccessible except by boat.

#### Site Access - Right Abutment

The right abutment was not accessed. Based on topographic maps, access appears to be as follows:

- From Road 211/Road 210 Intersection (Bellview), 3.5 mi. northeast on Road 210, past Hidden Lake Estates Road to Private Dirt Road. (See Fine Gold Reservoir access for access route from Friant Dam to Bellview).
- Right (southeast) on Private Dirt Road (ownership unknown), 2.5 mi. to end of dirt road.

---

Road crosses Fine Gold Creek approx. 1 mi. southeast of Road 210. Condition of crossing and road unknown.

- 3/4 mi. cross-country to upper right abutment (no trail and no vehicle access). Lower abutment slopes are very steep and inaccessible except by boat.

### **MP 279 DAMSITE (MIDDLE TEMPERANCE FLAT)**

#### **Site Access - Left Abutment**

- From Hwy 99, exit at Hwy 41 North
- 8 mi. north on Hwy 41 to Friant Rd. exit
- 12 mi. northeast on Friant Rd. to Millerton Rd.
- Right (east) on Millerton Rd., 5 mi. east to Auberry Rd.
- Left (northeast) on Auberry Rd., 3 mi. to Wellbarn Rd. (Marshall Station).
- Left (north) on Wellbarn Rd., 2.5 mi. to locked gate (USBR 2001 key required).
- 3 mi. west-northwest on well maintained dirt road passable to 2-wheel drive vehicles to trailhead (outhouse) at west edge of Temperance Flat near San Joaquin River.
- 2 mi. on hiking trail to upper left abutment.
- No vehicle access.

#### **Site Access - Right Abutment**

The right abutment was not accessed. Based on topographic maps, access appears to be as follows:

- From Road 211/Road 210 Intersection (Bellview), 6.5 mi. northeast on Road 210, past Hidden Lake Estates Road to Private Dirt Road. (See Fine Gold Reservoir access for access route from Friant Dam to Bellview). Permission to use private dirt road must be obtained in advance by contacting owner. Following information provided by sign at gate:
  - Contact Help Desk Supervisor at (800) 743-5000 to obtain required phone contact with customer, 509998 Rd 210 O'Neals. "The Toppings" on separate wooden nameplate.
- Right (southeast) on Private Dirt Road, 4 mi. to lower right abutment. Condition of road unknown. Road descends from canyon rim at El. 1482 via a series of switchbacks to just above river level at El. 580. Follow jeep road downstream to damsite.

Note: Both abutments accessible by boat.

### **MP 280 DAMSITE (UPPER TEMPERANCE FLAT)**

#### **Site Access - Left Abutment**

- From Hwy 99, exit at Hwy 41 North
  - 8 mi. north on Hwy 41 to Friant Rd. exit
  - 12 mi. northeast on Friant Rd. to Millerton Rd.
  - Right (east) on Millerton Rd., 5 mi. east to Auberry Rd.
  - Left (northeast) on Auberry Rd., 3 mi. to Wellbarn Rd. (Marshall Station).
  - Left (north) on Wellbarn Rd., 2.5 mi. to locked gate (USBR 2001 key required).
  - 3 mi. west-northwest on well maintained dirt road passable to 2-wheel drive vehicles to trailhead (outhouse) at west edge of Temperance Flat near San Joaquin River.
-

- 1 mi. on hiking trail to upper left abutment.

**Site Access - Right Abutment**

The right abutment was not accessed. Based on topographic maps, access appears to be as follows:

- From Road 211/Road 210 Intersection (Bellview), 6.5 mi. northeast on Road 210, past Hidden Lake Estates Road to Private Dirt Road. (See Fine Gold Reservoir access for access route from Friant Dam to Bellview). Permission to use private dirt road must be obtained in advance by contacting owner. Following information provided by sign at gate: Contact Help Desk Supervisor at (800) 743-5000 to obtain required phone contact with customer, 509998 Rd 210 O'Neals. "The Toppings" on separate wooden name plate.
- Right (southeast) on Private Dirt Road, 3.5 mi. to lower right abutment. Condition of road unknown. Road descends from canyon rim at El. 1482 via a series of switchbacks to just above river level at El. 580. Follow dirt road upstream to damsite.

Note: Both abutments accessible by boat.

	Yes	No
Photo Log		X
Photos	X	
Video Log (available)		X
Dictation Log (available)		X
Topographic Map	X	

**Purpose:**

Site review to determine site geologic and topographic conditions, potential structure types and locations, access, and further design data needs for Phase 1 Studies

**Field Observations:**

1. Existing Structures/Cultural Features:

There are no known structures located at any of the three damsites. Evidence of past prospecting (mining) activities was observed on both the left and right abutment of the MP 279 Damsite. Two residences and outbuildings, and structures associated with the Sullivan Mine are located at Temperance Flat. Construction of a high dam (Crest at elevation 1100) at any of the three Temperance Flat sites will inundate the three existing powerplants, switchyards, and power lines associated with Kerckhoff Dam and Reservoir. Kerckhoff Power Plants No. 1 and 2, Kerckhoff Dam and Reservoir, and Wishon Powerhouse, located on Kerckhoff Reservoir, are all located below elevation 1000, within the reservoir area for the higher proposed dams.

2. Right of Way/Access Restrictions:

---

See Site Access above and **Attachment 1 – General Information**

---

3. Overhead/Buried Utilities:

---

**MP 274 Site**

No utilities are present in the damsite area. The types and locations of utilities serving the community of Sky Harbor were not identified.

**MP 279 Site**

No utilities are present in the damsite area. Overhead power lines originating at Kerckhoff Powerhouses No. 1 and No. 2 run just east of and parallel to Wellbarn Rd. Overhead power lines originating at Wishon Powerhouse cross Wellbarn Rd. just north of Marshall Station. Signs marking a buried phone line were observed near roads in Temperance Flat.

**MP280 Site**

Same as for MP 279 Damsite

---

4. Description of Proposed Structures (See **Attachment 2, Figures 3-5**):

---

See attached drawing/map for locations of proposed Temperance Flat dam sites.

---

The three potential dam sites identified as MP 274, MP 279, and MP 280 (formerly identified as Lower, Middle, and Upper Temperance Flat, respectively) were reviewed as potential sites for a new dam and reservoir upstream of and/or in the upstream end of Millerton Lake. The MP 274 site, furthest downstream, is in a narrow section of the San Joaquin River/Millerton Lake just upstream of the Fine Gold Creek confluence. The site furthest upstream is in a narrow section of the river/reservoir slightly downstream of the area known as Temperance Flat. The MP 279 site is about two river miles downstream from Temperance Flat.

Based on the preliminary observations made during the field review, all of the sites are technically feasible for an embankment (rockfill), concrete gravity, or concrete arch dam with associated appurtenant structures; and offer the potential for a dam with a maximum crest elevation of about 1100. Dams with crest elevations greater than 1,100 feet are technically possible, although probably not feasible, or necessary, to obtain the desired storage capacities.

At any of the three sites, the base of the dam would be below the existing Millerton Lake top of active conservation water surface elevation 578, ranging from about 200 feet at the MP 274 site (lower site), about 120 feet at the MP 279 site (middle site) and about 80 feet at the MP 280 site (upper site), requiring large cofferdams upstream and downstream of the worksite for unwatering/dewatering, and diversion.

---

For those sites considered during the field review, the MP 279 site appears to be the best location for a new dam, considering the depth of Millerton Lake at the location, access, and geologic and topographic conditions. The proposed structures described here are for the MP 279 site, although similar structures and configurations would likely apply to the other sites. The MP 279 site is technically suitable for a concrete arch, concrete gravity, or embankment (rockfill) dam, and associated appurtenant structures. The approximate alignments for the dams are shown on the attached drawing, See **Attachment 2, Figures 3-5**. The maximum crest elevation considered for the site is about elevation 1100, and the original streambed elevation (prior to Friant Dam) is about elevation 460, resulting in a maximum dam height of about 640 feet. Further evaluation is necessary to determine the most viable option, considering the availability and costs of construction materials, comparison of the costs associated with diversion requirements, and the necessary spillway, outlet works and power generating facilities for each dam type. Based on the observations during the field review and preliminary information currently available, the following dam types/appurtenant structure configurations should be further considered for the Phase 1 studies:

**Concrete arch dam** – A concrete arch dam, with a maximum height of about 640 feet (crest elevation 1100, streambed elevation 460) would have a crest length of about 3200 feet. The arch dam would bend into each abutment, just upstream from the defined ridges, as shown on the attached drawing. The left abutment of the arch dam would require an extension to the left perpendicular to the arch with a gravity section or thrust block. The thrust block would extend about 400 feet across a saddle with a maximum height of approximately 50 feet. An embankment dike could be used to fill this saddle beyond the limits of the thrust block.

**Concrete gravity dam** - The alignment for the rockfill dam and concrete gravity dam would be similar, as shown on the attached drawing. The concrete gravity dam would be constructed with roller compacted concrete (RCC). The gravity section would extend straight into the left abutment across the saddle to the 1100 contour for a maximum crest length of 3700 feet. Alternately, the gravity section could extend into the left abutment to the elevation 1080 contour (crest length of 3200 feet), and an embankment dike could be used to fill this saddle beyond the 1080 contour (about 500 feet).

**Embankment (Rockfill) Dam** – A concrete-faced or thin-core rockfill dam with a maximum height of about 640 feet (crest elevation 1100, streambed elevation 460) would have a crest length of about 3200 feet. A saddle dam/dike would have to extend and additional 500 feet to the left to close off a low area high on the left abutment. The lowest contour in the saddle is about elevation 1050. The saddle may be a suitable spillway location (see Appurtenant Structures), with the spillway discharging into Millerton Lake about 1500 feet downstream of the dam centerline.

A conventional zoned-embankment dam was also considered but ruled out based on availability and quantity of materials required to develop an adequately zoned structure, and the potentially higher costs associated with a diversion scheme.

---

---

**Diversion** - Any type of dam at this location will require large, approximately 130-foot high cofferdams, both upstream and downstream of the site, to allow site unwatering/dewatering, and river diversion during construction. The downstream cofferdams may need to be about 20 feet higher to allow for diversion during construction. The distance between cofferdams would probably be the same for both concrete dam options, because of the curvature required for the arch section, even though the base width would be much narrower for the arch dam. The distance between cofferdams for the rockfill dam option would be significantly greater.

A tunnel diversion scheme is anticipated for all options. The tunnel would be excavated through the left abutment. The length of the tunnel will be similar for the concrete dam options and significantly longer for the rockfill option. The tunnel will be sized to accommodate the selected diversion flood. Once the outlet works are constructed for the concrete gravity dam, the diversion flows could be routed through these facilities. The outlets for the arch dam option, however, would not likely be useable until the contraction joints were completely grouted.

- 
5. Description of Appurtenant Features (spillways, tunnels, pumping plants, flood routing/coffer dams/dewatering during construction, outlet works, switch yards, transformer yards, transmission lines, conveyance pipelines/canals, access roads, security, operation/maintenance):
- 

**Concrete Arch Dam** - The arch dam would include an ungated spillway over the center of the dam with a flip section that would project flows into the tailwater below. The crest of the spillway would be approximately 15 to 20 feet below the dam crest, and approximately 250 feet long.

An outlet for a penstock would pass through the left side of the arch dam, and the penstock would route flows to a powerplant located on the left abutment in an existing cove about 1000 feet downstream from the dam. The powerplant would have a bypass for routing flows directly into Millerton Lake without passing through the generator. Another outlet on the right side of the dam will be evaluated for additional drawdown capacity. The size and location of these facilities will be determined based on available criteria and assumptions regarding reservoir operations.

**Concrete Gravity Dam** - The concrete gravity dam will also include an ungated overflow spillway with guide walls. Stair steps may be considered for energy dissipation, unless tailwater is expected to remain relatively high during all anticipated spillway release periods.

The location and sizing of outlet facilities for the concrete gravity dam will be similar to the arch dam option.

**Rockfill Dam** - A spillway for the rock fill dam option would include a cut through the

---

---

saddle on the left abutment. Gravity walls and a concrete ogee section would be required to form the sidewalls and provide control. The outlet channel would be excavated into rock.

The outlet works for the rock fill dam option could consist of tunnels through the abutments or could be notched into the abutments and backfilled with concrete to blend into the abutments. The sizes would be similar to the concrete dam options, but an energy dissipater may be required for any outlets not passing through the powerhouse.

A spillway passing through the saddle on the left abutment would impact the powerplant location proposed for the concrete dam options. Further evaluation is required to determine appropriate power facilities locations for the rockfill dam option.

---

6. Briefly Describe Geologic/Geotechnical Site Conditions:

---

**General Area Geologic/Geotechnical Conditions** - The dam sites associated with the Upper San Joaquin River Study include 1) raising the existing Friant Dam and Dike, 2) four potential new damsites on the Upper San Joaquin River (MP 274, MP 279, MP 280, and Kerckhoff), and 3) a new potential offstream dam site (Fine Gold) on the Fine Gold Creek drainage. These damsites are located along the western border of the central portion of the Sierra Nevada province at its boundary with the eastern edge of the Great Valley province of California. Friant Dam is founded on metamorphic rocks consisting of quartz biotite schist, intruded by aplite and pegmatite dikes and by inclusions of dioritic rocks. The contact of these metamorphic rocks with the Sierra Nevada batholith lies just east of the dam in Millerton Lake. The Sierra Nevada batholith is comprised of primarily intrusive rocks, including granite and granodiorite, with some metamorphosed granite including granite gneiss. The intrusive Sierra Nevada batholith rocks underlie most of Millerton Lake and the MP 274, MP 279, MP 280, Kerckhoff, and Fine Gold dam sites. Occasional remnants of lava flows and layered tuff are present in the Millerton Lake area at the highest elevations.

The central Sierra Nevada has a complex history of uplift and erosion. The most recent uplift tilted the western flank of the Sierra Nevada to the west. At the western border, rocks of the Sierra Nevada are overlapped by alluvium and sedimentary rocks of the Great Valley Province. The metamorphic rocks in the Friant Dam area dip steeply downstream to the west, and strike northwesterly. Erosion has resulted in thin alluvial cover.

**MP 274 Site (Lower Temperance Flat Site)**

The MP 274 Site, or Lower Temperance Flat Site, rises steeply from elevation 370 in the original San Joaquin River channel at milepost 274.1 to elevation 600, and then rises more gradually to elevation 1100 on both abutments (Photographs 6 through 9). Maximum elevations are 1502 at Pincushion Mountain on the left abutment and 1294 at an unnamed mountain on the right abutment.

---

Both abutments and the channel section are granite and granodiorite, with alluvium in the channel section. The granite is typically hard to very hard where exposed in the steep slopes below elevation 600. In the more gradual slopes above elevation 600, the upper one to ten feet of the granite is intensely weathered to decomposed and soft to very soft. This material (decomposed granite) represents a weathered, in-place, soil-like profile at the ground surface. Hard erosion-resistant granite outcrops are scattered on the abutment slopes above elevation 600. Some of these outcrops are detached blocks of rock up to 25 feet in maximum dimension.

Alluvium of unknown thickness occurs below the reservoir water surface in the San Joaquin River channel. The alluvium probably ranges from fine to coarse grained, with rock blocks up to 25 feet in maximum dimension that detached from the abutment slopes.

Unstable wedges, toppling, or slides were not observed at the MP 274 site. The granitic bedrock has adequate strength and stability for embankment, rockfill, concrete gravity, RCC, or concrete arch structures and any required river diversion feature. The granite is adequate foundation for a plunge pool or overflow spillway.

#### **MP 279 Site (Middle Temperance Flat Site)**

The MP 279 Site, or Middle Temperance Flat Site, rises uniformly from elevation 460 in the original San Joaquin River channel at milepost 278.9 to elevation 1080 on the left abutment, and then through a saddle at elevation 1040 before continuing to elevation 1416 at an unnamed mountain (Figure 2 and Photographs 10 through 12). The right abutment rises uninterrupted to elevation 1566 to an unnamed mountain. There are several gold mining prospect sites located on the lower right abutment.

Both abutments and the channel section are mostly granite and granodiorite, with alluvium in the channel section. The granite is typically hard to very hard where exposed in the bottom of drainages and along the reservoir shoreline. Away from the drainage features, the upper one to ten feet of the granite is intensely weathered to decomposed and soft to very soft. This material (decomposed granite) represents a weathered, in-place, soil-like profile at the ground surface. Hard erosion-resistant granite outcrops are scattered on the abutment slopes. Some of these outcrops are detached blocks of rock up to 25 feet in maximum dimension. A zone of hard, slightly fractured meta-granite or granite gneiss (Photo 13) is present near the dam centerline on the left abutment and appears to outcrop in a shallow drainage located upstream of the dam centerline on the right abutment.

Alluvium of unknown thickness occurs below the reservoir water surface in the San Joaquin River channel. The alluvium probably ranges from fine to coarse grained, with rock blocks up to 25 feet in maximum dimension that detached from the abutment slopes.

Unstable wedges, toppling, or slides were not observed at the MP 279 site. The granitic

---

bedrock has adequate strength and stability for embankment, rockfill, concrete gravity, RCC, or concrete arch structures and any river diversion feature. The granite is adequate foundation for a plunge pool or overflow spillway.

**MP 280 Site (Upper Temperance Flat Site)**

The MP 280 Site, or Upper Temperance Flat Site, rises steeply on the lower left abutment from elevation 490 in the original San Joaquin River channel at milepost 280, and then through a saddle at elevation 870 before continuing to elevation 1416 at an unnamed mountain (Photographs 15 through 17). The right abutment rises more gradually from the river channel to elevation 2220 at an unnamed mountain. The MP 280 Site is located near Mile Post 280 on the San Joaquin River.

Both abutments and the channel section are granite and granodiorite, with alluvium occurring in the channel section. The granite is typically hard to very hard where exposed in the bottoms of drainages and along the reservoir shoreline. Away from these exposures, the upper one to ten feet of the granite is intensely weathered to decomposed and soft to very soft. This material (decomposed granite) represents a weathered, in-place, soil-like profile at the ground surface. Hard erosion-resistant granite outcrops are scattered on the abutment slopes above elevation 600. Some of these outcrops are detached blocks of rock up to 25 feet in maximum dimension.

Alluvium of unknown thickness occurs below the reservoir water surface in the San Joaquin River channel. The alluvium probably ranges from fine to coarse grained, with rock blocks up to 25 feet in maximum dimension that detached from the abutment slopes.

Unstable wedges, toppling, or slides were not observed at the MP 280 site. The granitic bedrock has adequate strength and stability for embankment, rockfill, concrete gravity, RCC, or concrete arch structures and any river diversion feature. The granite is adequate foundation for a plunge pool or overflow spillway.

---

7. **Location/Description of Nearest Borrow Areas (See Attachment 2, Figure 1):**

---

Based on observations during the field review, the following are potential sources for construction materials. Additional evaluation of materials is necessary to determine the adequacy, availability, and quantities of materials in these and other sources.

Rock fill – Quarried from reservoir area.

Earthfill – Limited quantities of low-plasticity, fine-grained soils located within reservoir area at Temperance Flat. Additional quantities of fine-grained soils may be available in the Auberry Valley area, and in an area south of Millerton Road near the

---

---

Millerton Lake Recreation Area entrance. Road cuts in Temperance Flat and the Auberry Valley expose decomposed to intensely weathered granite.

Processed sands and gravels – Commercial sources and/or crushing and processing of quarried rock in the reservoir area.

Concrete aggregate - Commercial sources and/or crushing and processing of quarried rock in the reservoir area.

---

---

8. Location/Description of Equipment/Material Staging and Lay Down Areas (See Attachment 2, Figure 1):

---

MP 274 site – Construction use/staging/lay down areas would likely be located at an existing recreation area downstream of the site about 0.5 miles along the left side of Millerton Lake.

MP 279 site – Construction use/staging/lay down area would likely be located at Temperance Flat about 1.5 miles upstream from the site. Another potential location would be along the right side of the river about 0.5 to 1.0 mile upstream.

MP 280 site – Construction use/staging/lay down area would likely be at Temperance Flat, about 0.5 miles upstream of site.

---

---

9. Identification of Environmental Sensitive Areas (wetlands, springs, rivers, streams, endangered/threatened species habitats, etc.):

---

A detailed discussion of environmentally sensitive areas and environmental considerations for the Temperance Flat sites are presented in a separate report.

---

---

10. Description of Mining or Other Anthropologic Activities:

---

Historically mining activities occurred in the reservoir area at Temperance Flat (Sullivan Mine) and other locations. Prospecting activities are evident at the MP 279 damsite. Mining and/or prospecting in any of the areas are no longer active.

---

---

11. Action Items/Data Needs (list who has responsibility and schedule for completion):

---

The following action items/data needs list shows the data requirements for appraisal level designs and cost estimates for the various dam and appurtenant structures options of the Temperance Flat sites. The highest priority for data will be the MP 279 site, since

---

observations during the field review indicate that this site appears to be the best dam and appurtenant structures location of the three sites reviewed.

#### Action Items/Data Needs

ITEM NO.	DESCRIPTION	RESPONSIBLE PARTY
1	Finalize detailed topography (1"=200', 5' contours)	MP-200/ July 19, 2002
2	Calculate volume of water between: <ul style="list-style-type: none"> <li>• MP 274 and MP 279 Damsites</li> <li>• MP 279 and MP 280 Damsites</li> </ul> Assume water surfaces at El. 1100	MP-200/ July 19, 2002
3	Develop reservoir area-capacity for reservoir water surfaces up to El. 1100	MP-200/ July 19, 2002
4	Obtain historical records of Friant Reservoir operations.	TSC/ July 19, 2002
5	Obtain bottom contours (underwater topography) at MP 274, MP 279, and MP 280 Damsites, for a distance of about 1000 feet downstream of dam alignments.	MP-200, TSC/ August 9, 2002
6	Prepare cross sections (profiles) on centerline at MP 274, MP 279, and MP 280 Damsites	TSC/ July 19, 2002
7	Obtain results of past Millerton Lake sediment surveys (if available)	TSC/ July 19, 2002
8	Develop Hydrologic Data, PMF and diversion floods for each site.	TSC/ August 9, 2002
9	Geologic Conditions/Mapping and materials investigations. Identify conditions that may preclude consideration of concrete arch dam	MP-200, TSC/ August 9, 2002
10	Seismic/Seismotectonic Hazard Evaluation	TSC D-8330/ August 9, 2002
11	Identify existing structures/facilities located within the potential reservoir area, up to about elevation 1100.	MP-200, TSC/ August 1, 2002

#### 12. Routing:

---

---

MWH - 5  
USBR - 5  
DWR - 2

---

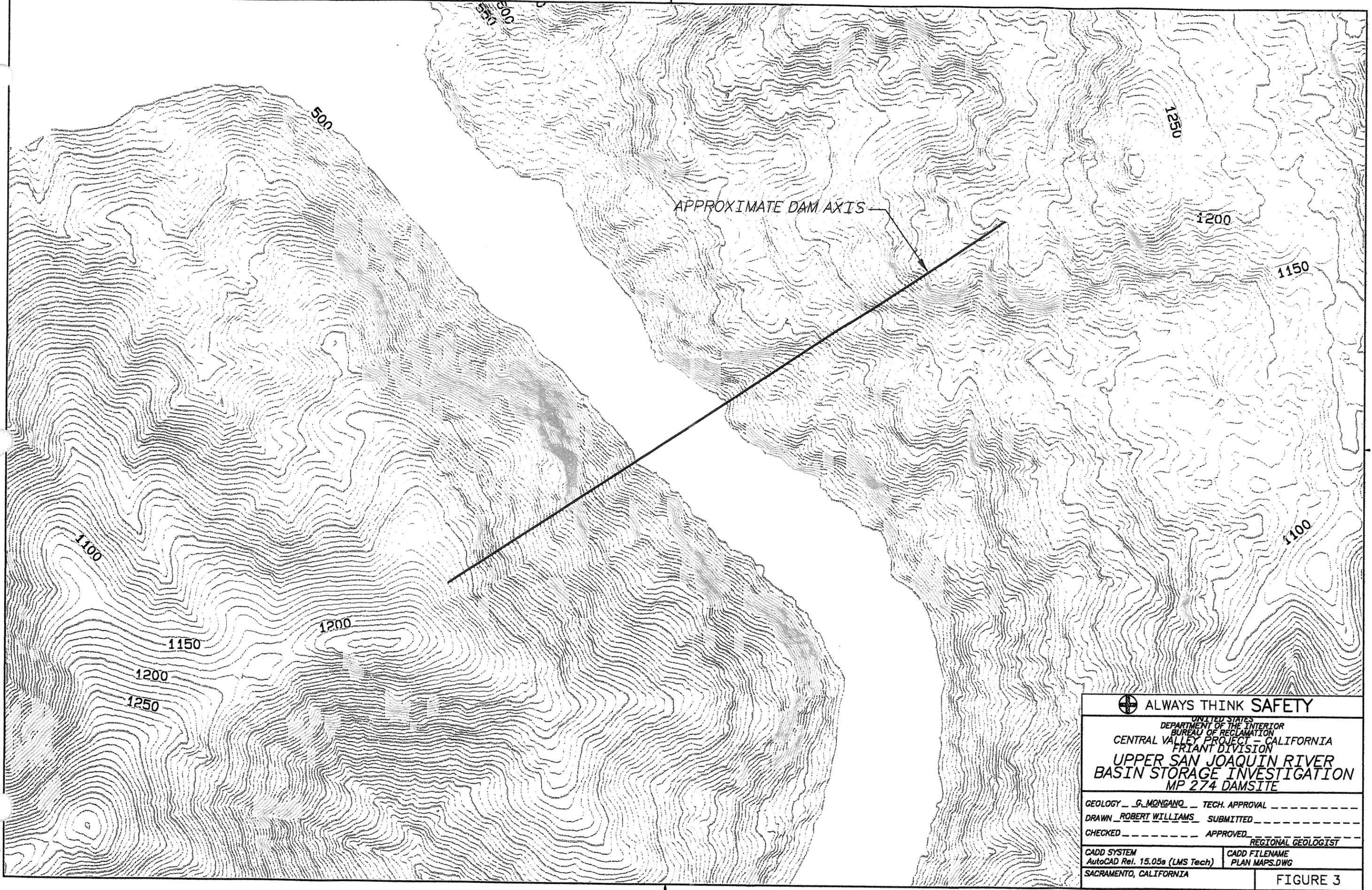
---

# **ATTACHMENT 2**

## Figures

Figures scale is 1"=400'.  
Contour interval is 10 ft.

FIGURE 3



APPROXIMATE DAM AXIS

ALWAYS THINK SAFETY

UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 BUREAU OF RECLAMATION  
 CENTRAL VALLEY PROJECT - CALIFORNIA  
 FRIANT DIVISION  
 UPPER SAN JOAQUIN RIVER  
 BASIN STORAGE INVESTIGATION  
 MP 274 DAMSITE

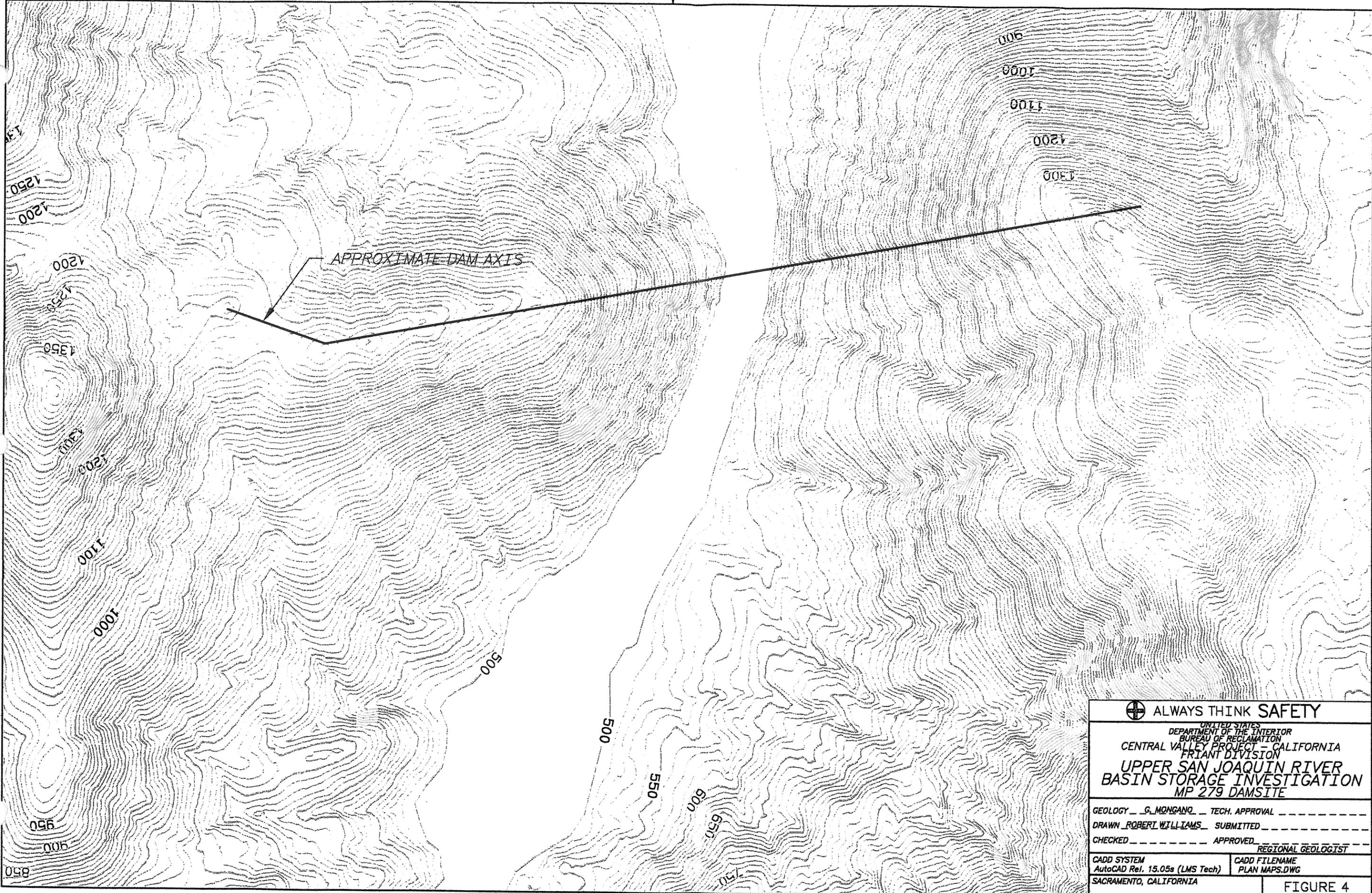
GEOLOGY G. MORGANO TECH. APPROVAL \_\_\_\_\_  
 DRAWN ROBERT WILLIAMS SUBMITTED \_\_\_\_\_  
 CHECKED \_\_\_\_\_ APPROVED \_\_\_\_\_  
 REGIONAL GEOLOGIST

CADD SYSTEM AutoCAD Rel. 15.05a (LMS Tech) CADD FILENAME PLAN MAPS.DWG  
 SACRAMENTO, CALIFORNIA

FIGURE 3

PLOTTED BY EVANCE

FIGURE 4



APPROXIMATE DAM AXIS

⊕ ALWAYS THINK SAFETY

UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 BUREAU OF RECLAMATION  
 CENTRAL VALLEY PROJECT - CALIFORNIA  
 FRIANT DIVISION  
 UPPER SAN JOAQUIN RIVER  
 BASIN STORAGE INVESTIGATION  
 MP 279 DAMSITE

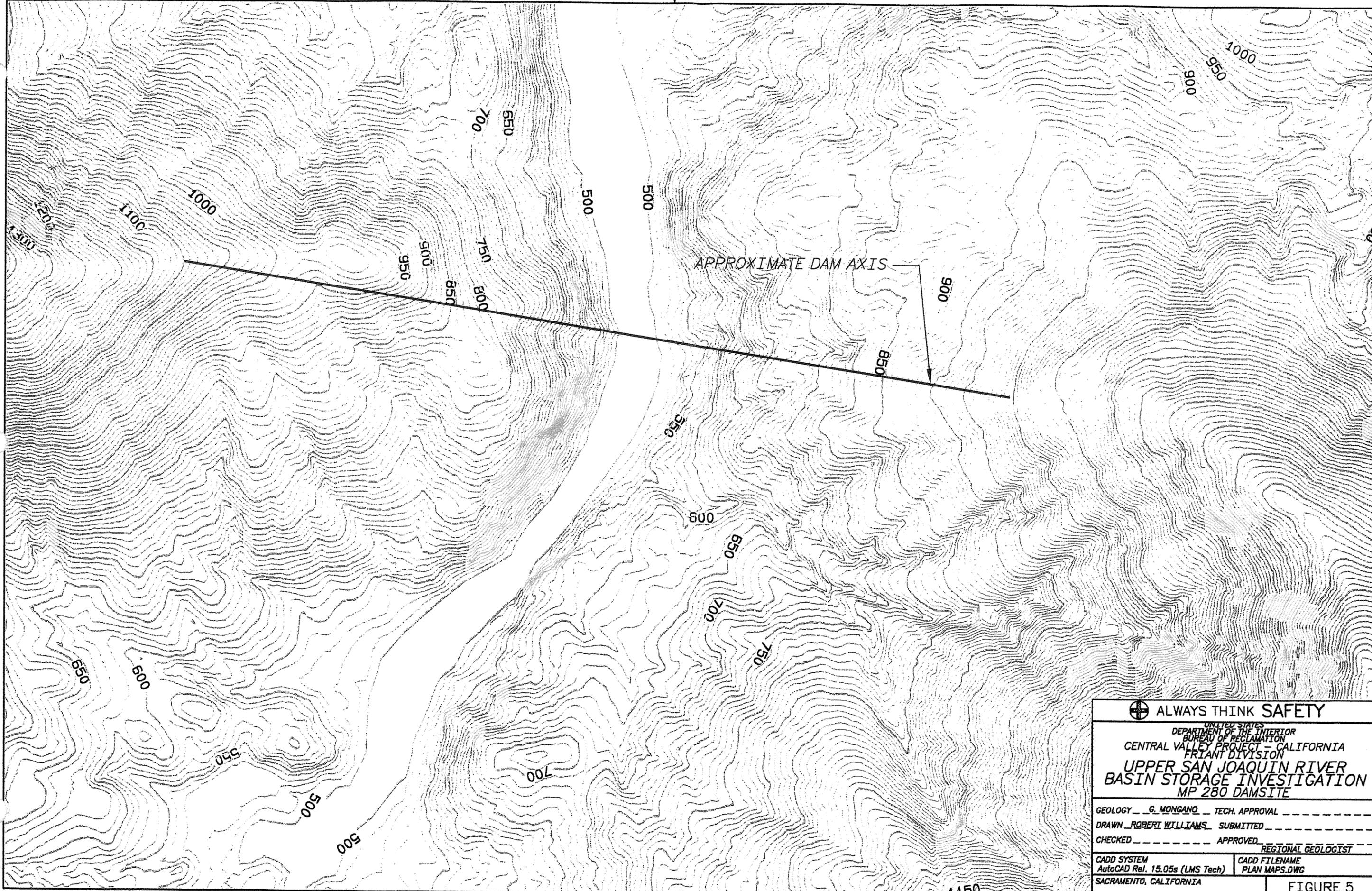
GEOLOGY G. MORGANO TECH. APPROVAL -----  
 DRAWN ROBERT WILLIAMS SUBMITTED -----  
 CHECKED ----- APPROVED REGIONAL GEOLOGIST -----

CADD SYSTEM AutoCAD Rel. 15.05s (LMS Tech) CADD FILENAME PLAN MAPS.DWG  
 SACRAMENTO, CALIFORNIA

FIGURE 4

PLOTTED BY EVANCE

FIGURE 5



 <b>ALWAYS THINK SAFETY</b>	
<small>UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION</small> <b>CENTRAL VALLEY PROJECT CALIFORNIA PRIANT DIVISION</b> <b>UPPER SAN JOAQUIN RIVER BASIN STORAGE INVESTIGATION MP 280 DAMSITE</b>	
GEOLOGY	<u>G. MONGANO</u> TECH. APPROVAL
DRAWN	<u>ROBERT WILLIAMS</u> SUBMITTED
CHECKED	APPROVED _____ REGIONAL GEOLOGIST
CADD SYSTEM AutoCAD Rel. 15.05s (LMS Tech)	CADD FILENAME PLAN MAPS.DWG
SACRAMENTO, CALIFORNIA	FIGURE 5

AUGUST 5, 2002 10:05  
 PLOTTED BY  
 EVANCE

# **ATTACHMENT 3**

## Photographs

## **ATTACHMENT 3 – PHOTOGRAPHS**

### **Site Review – Temperance Flat and Fine Gold Damsites, and Friant Dam Raise**

Some photographs in this section of the Trip Report refer to the MP274 site as Pincushion Damsite and to the MP 279 site as Prospect Damsite in reference to landmarks noted on USGS topographic maps of the area. The photograph labels and captions were written and scanned prior to the determination to refer to the sites by the respective nearest River Mile Post marker appearing on the topographic maps.



Photo 5

Upper San Joaquin River Basin Storage Project

### HIDDEN LAKE ESTATES

View to the south of the community of Hidden Lake Estates with Sky Harbor, Pincushion Mt. and Millerton Lake in the background.

J. Sturm

April 16, 2001



Photo 6

Upper San Joaquin River Basin Storage Project

### PINCUSHION DAMSITE

View upstream (southeast) of the damsite. Steep lower slopes expose hard, water-scoured moderately to slightly fractured granitic rock.

J. Sturm April, 16, 2001



Photo 7

Upper San Joaquin River Basin Storage Project

**PINCUSHION DAMSITE**

View downstream (northwest) of the damsite. Steep lower slopes expose hard, water-scoured moderately to slightly fractured granitic rock.

J. Sturm

April 16, 2001

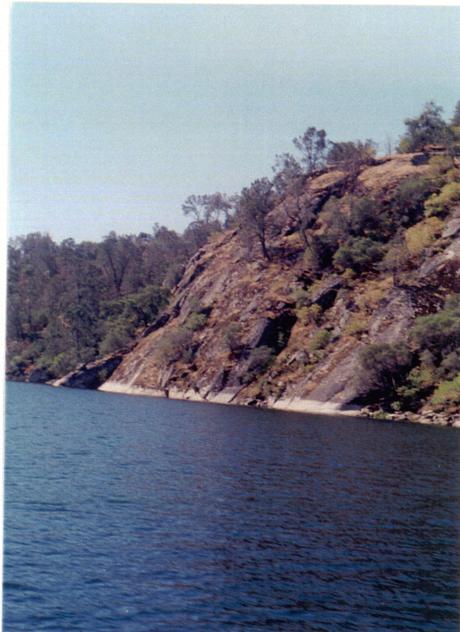


Photo 8

Upper San Joaquin River Basin Storage Project

**PINCUSHION DAMSITE**

Closeup view downstream (northwest) of the right abutment.

J. Sturm

June 12, 2002

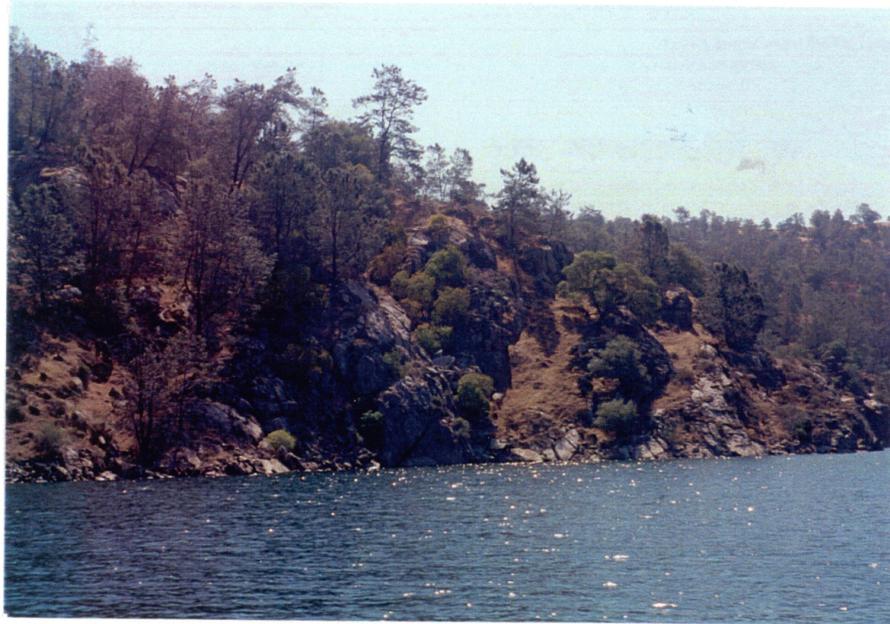


Photo 9

Upper San Joaquin River Basin Storage Project

**PINCUSHION DAMSITE**

View downstream (east) of the left abutment.

J. Sturm

June 12, 2002



Photo 10

Upper San Joaquin River Basin Storage Project

**PROSPECT DAMSITE**

View upstream (north) of the damsite Crook Mtn. is visible behind the right abutment at photo left. The maximum elevation of the left abutment (photo right) is El.

J. Sturm

June 12, 2002



Photo 11

Upper San Joaquin River Basin Storage Project

**PROSPECT DAMSITE**

View upstream (north) of the shoreline along the lower right abutment with Crook Mtn. in the background. The shoreline exposes granitic and metagranitic (granitic gneiss) rock.

J. Sturm

April 16, 2001



Photo 12

Upper San Joaquin River Basin Storage Project

**PROSPECT DAMSITE**

View west of the right abutment. A few shallow prospects (hand-dug pits) are present on the lower slope. Dirt jeep trails on the lower abutment connect to a private road that provides access to the canyon from Road 210, a major dirt road to the west.

J. Sturm

June 13, 2002



Photo 13

Upper San Joaquin River Basin Storage Project

**PROSPECT DAMSITE**

A 5-foot diameter meta granitic (granite gneiss) boulder located on the middle left abutment. A prominent ridge of meta granitic rock trending subparallel to damsite centerline outcrops near the centers of both abutments.

J. Sturm

June 13, 2002

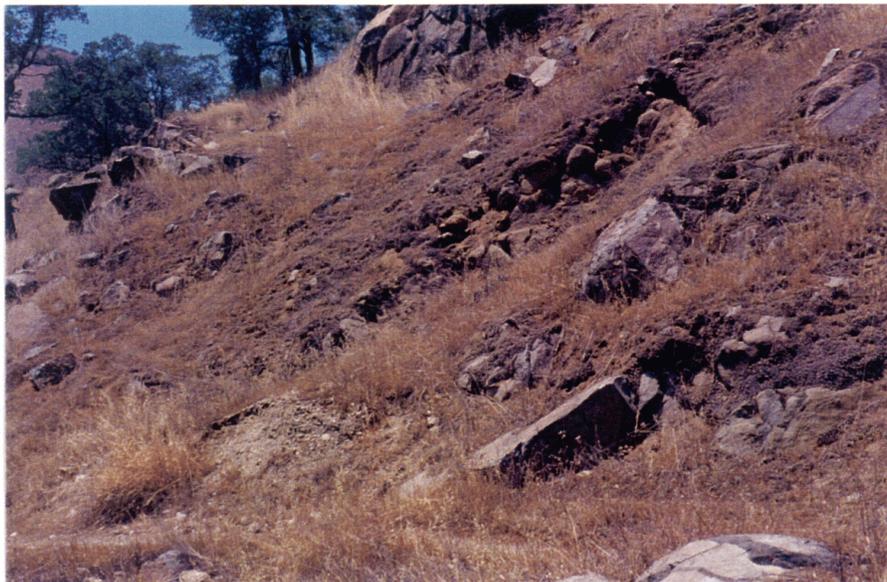


Photo 14

Upper San Joaquin River Basin Storage Project

**PROSPECT DAMSITE**

View upstream (north) of a prospect in granitic rock located just downstream of the damsite on the left abutment at about El. 980. This gold (?) prospect is believed to be similar to those located on the right abutment.

J. Sturm

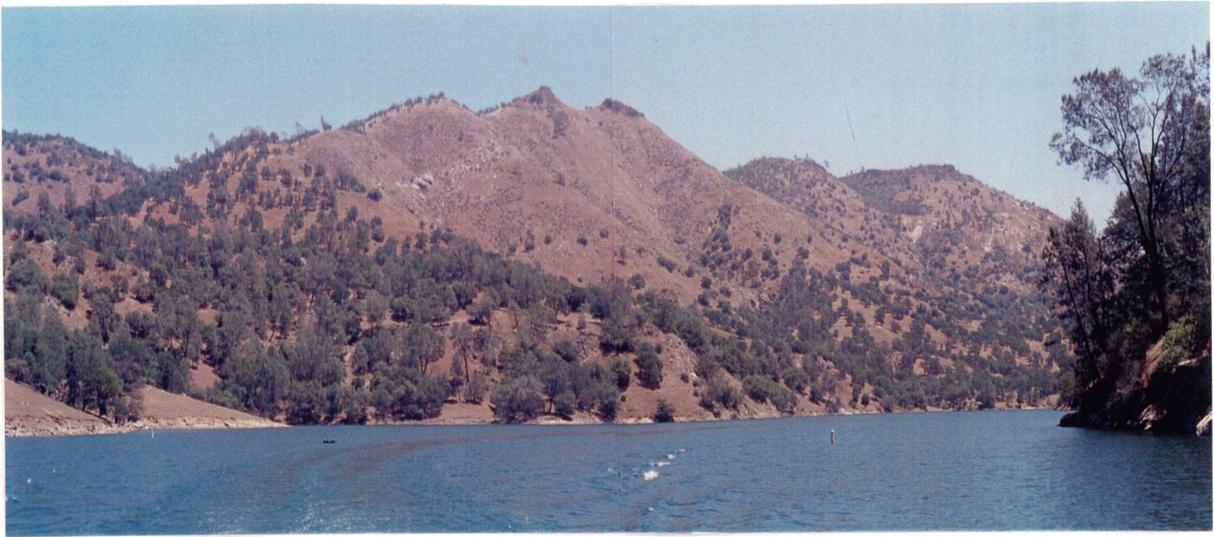


Photo 15

Upper San Joaquin River Basin Storage Project

**MP 280 DAMSITE**

View upstream (northeast) of the damsite (primarily the right abutment).

J. Sturm

June 12, 2002



Photo 16

Upper San Joaquin River Basin Storage Project

**MP 280 DAMSITE**

View downstream (northwest) of the damsite.

J. Sturm

June 12, 2002

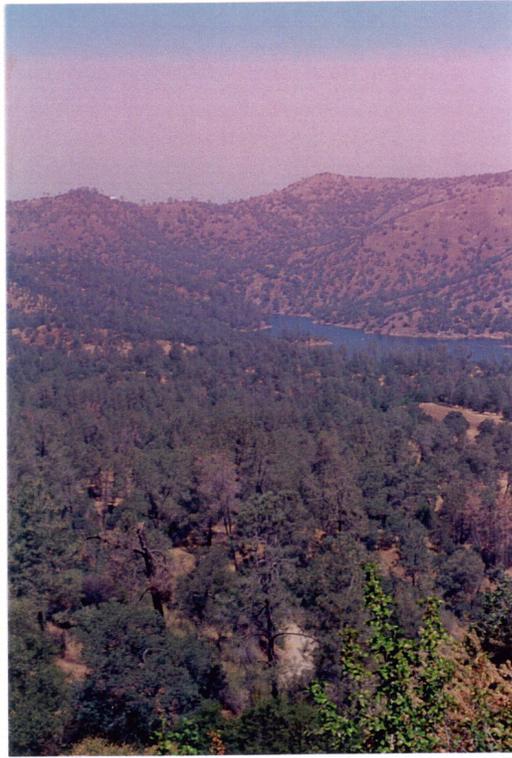


Photo 17

Upper San Joaquin River Basin Storage Project

**TEMPERANCE FLAT AND MP 280 DAMSITE**

View downstream (northwest) of Temperance Flat and the MP280 Damsite (approximately where the river disappears at photo center).

J. Sturm

June 13, 2002

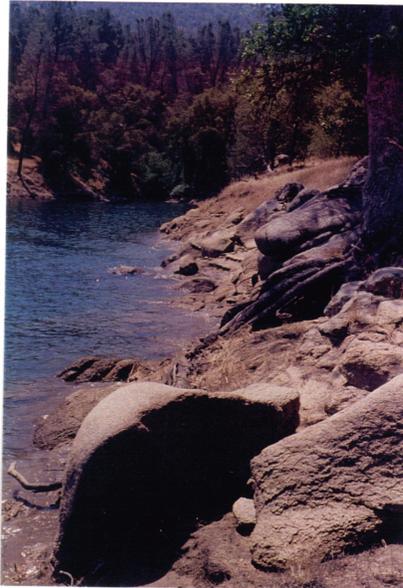


Photo 18

Upper San Joaquin River Basin Storage Project

**TEMPERANCE FLAT AND MP 280 DAMSITE**

Hard, granitic corestones and weathered granitic rock exposed along the shoreline in the Temperance Flat area. Hard granitic outcrops, weathered rock exposed in roadcuts and water-scoured shorelines all suggest a very thin soil cover over a typical granitic weathering profile throughout the Temperance Flat area.

J. Sturm

June 13, 2002



Photo 27

Upper San Joaquin River Basin Storage Project

### **FINE GOLD RESERVOIR**

Panoramic view to the southwest of the reservoir area. The highest peak in the background is Hulbert Mtn. (El. ).

J. Sturm

April 17, 2001



Photo 28

Upper San Joaquin River Basin Storage Project

### **KERCKHOFF POWERHOUSE NO. 2**

Panoramic view to the northeast of the San Joaquin River canyon from the road just south of Temperance Flat. Kerckhoff Powerhouse No. 1 and a waste berm are visible at photo center. The waste berm is composed of "tunnel muck" (mostly granitic rock fragments) that was produced by the excavations for the underground powerhouse and access tunnels.

J. Sturm

June 12, 2002