Hetch Hetchy Regional Water System

Water Treatment Plant Operators Training Program

Program Overview

- Goals of the Program
- Target Audience
- Program Development
- Training Roadmap
  - Course #1- Today's Session
  - Potential Future Courses

Course #1: Introduction to Regional Water System Operations

Learning Objectives:

1) Become familiar with the Regional Water System Ops Plan and SFPUC organization

2) Gain knowledge of facilities and conveyance systems of the Regional Water System

3) Learn to make decisions based on operational factors

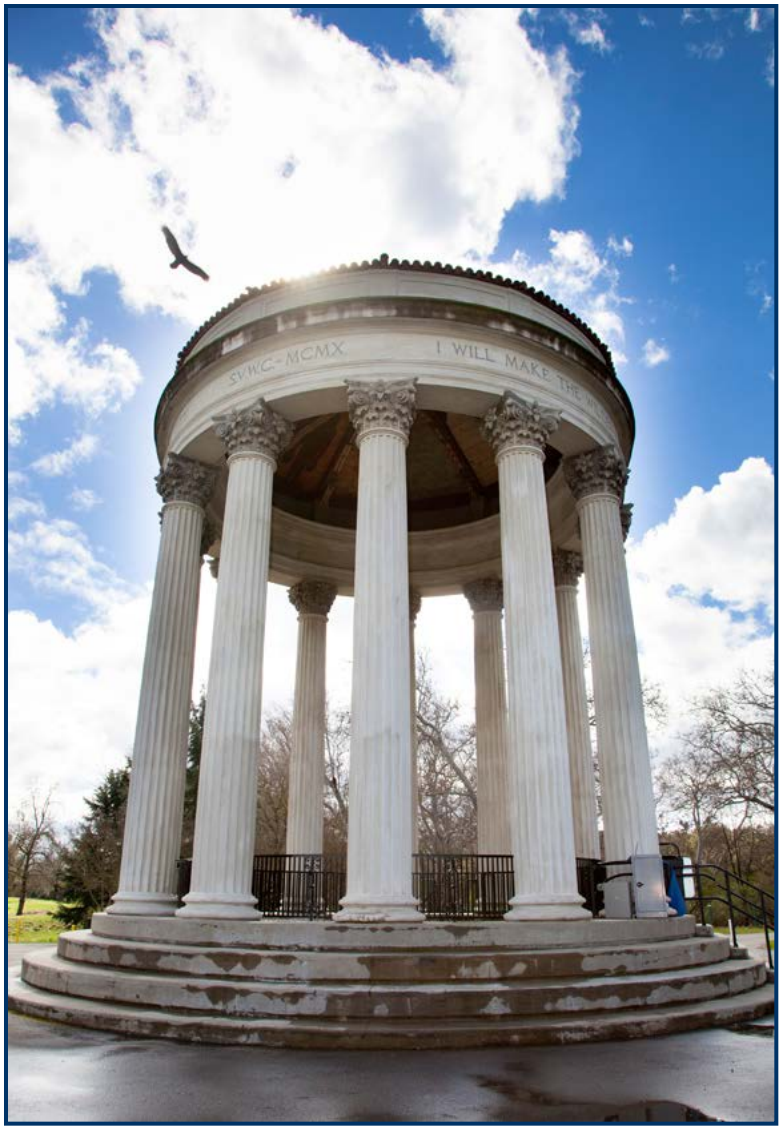
Ground Rules

Please:

- Turn phones off or on silent
- Hold questions until the question and answer period (if possible)
- Talk one at a time

Agenda

- Overview and Introductions
- Pre-Test
- Learning Objectives
- Post-Test
- Evaluations



Participant Introductions

- Name
- Position
- Years in water treatment and SFPUC
- One thing you would like to learn from the class

Hetch Hetchy Regional Water System

Pre-Test

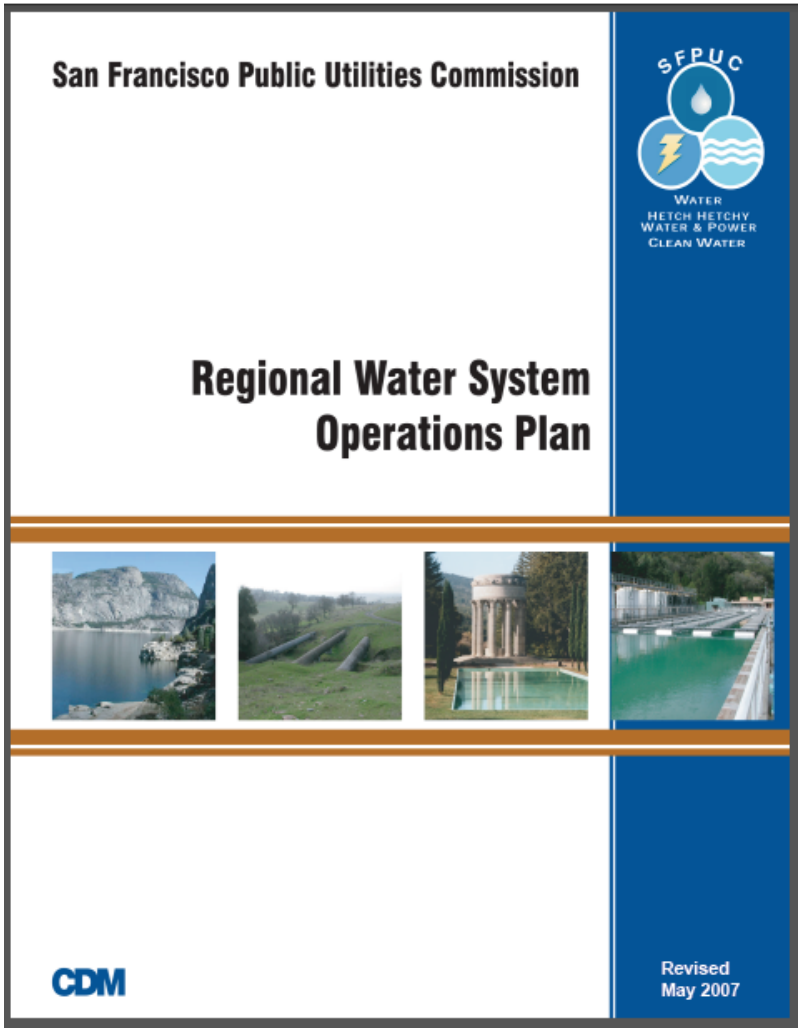
Moving on to..

Learning Objective #1

Become familiar with the Regional Water System Operations (Ops) Plan and SFPUC organization

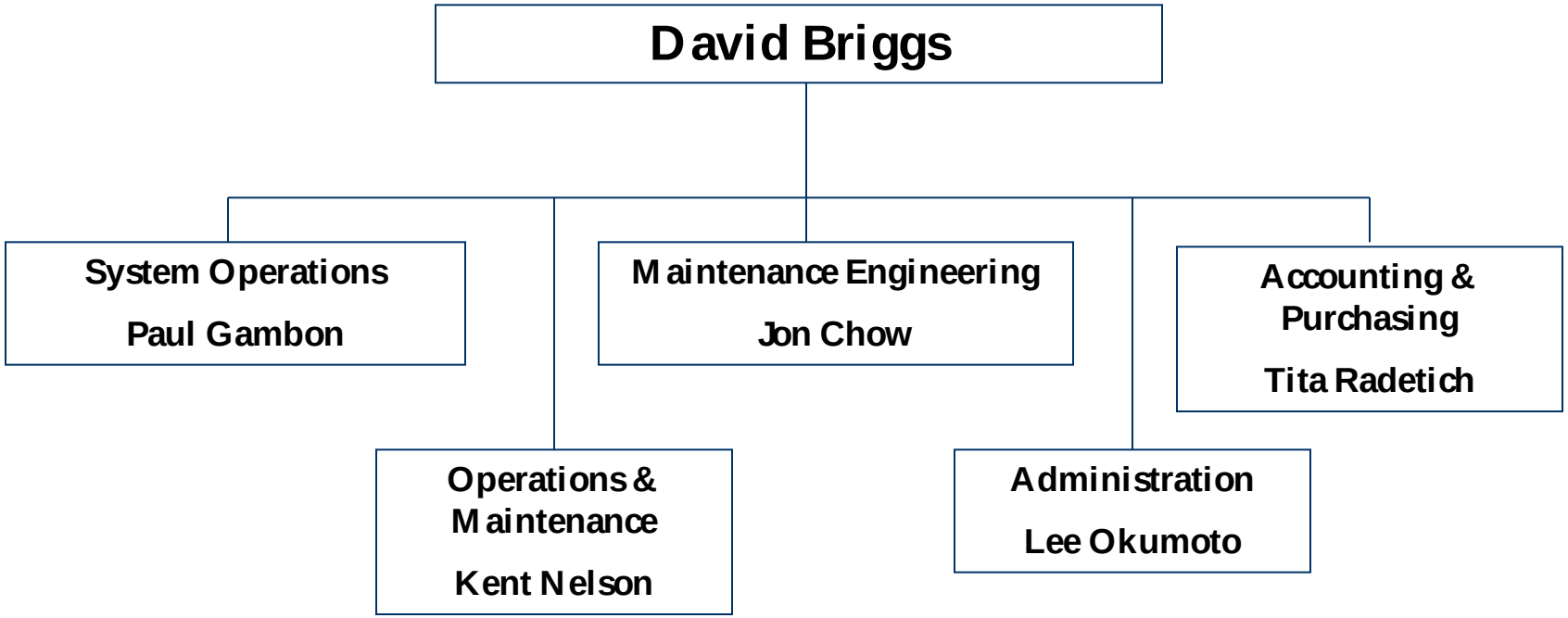
Introduction to RWS Ops Plan

- Regional Water System Operations Plan
- Purpose
- ***Accessible via the WIKI site***



Hetch Hetchy Regional Water System

Water Supply & Treatment Division



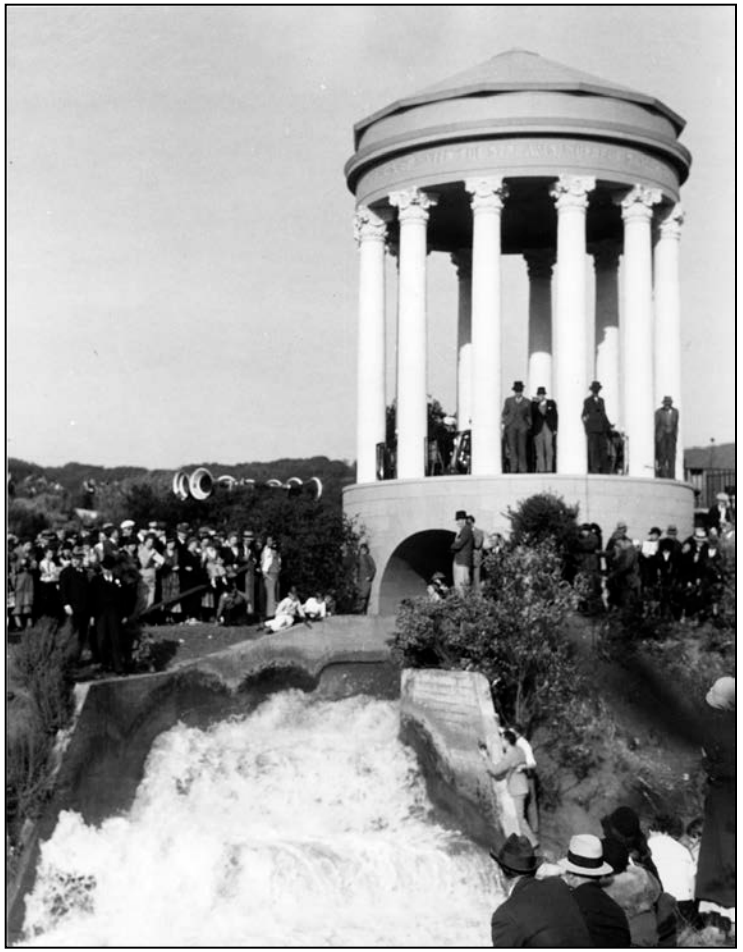
Moving on to..

Learning Objective #2

Gaining knowledge of the treatment facilities and conveyance systems of the Regional Water System

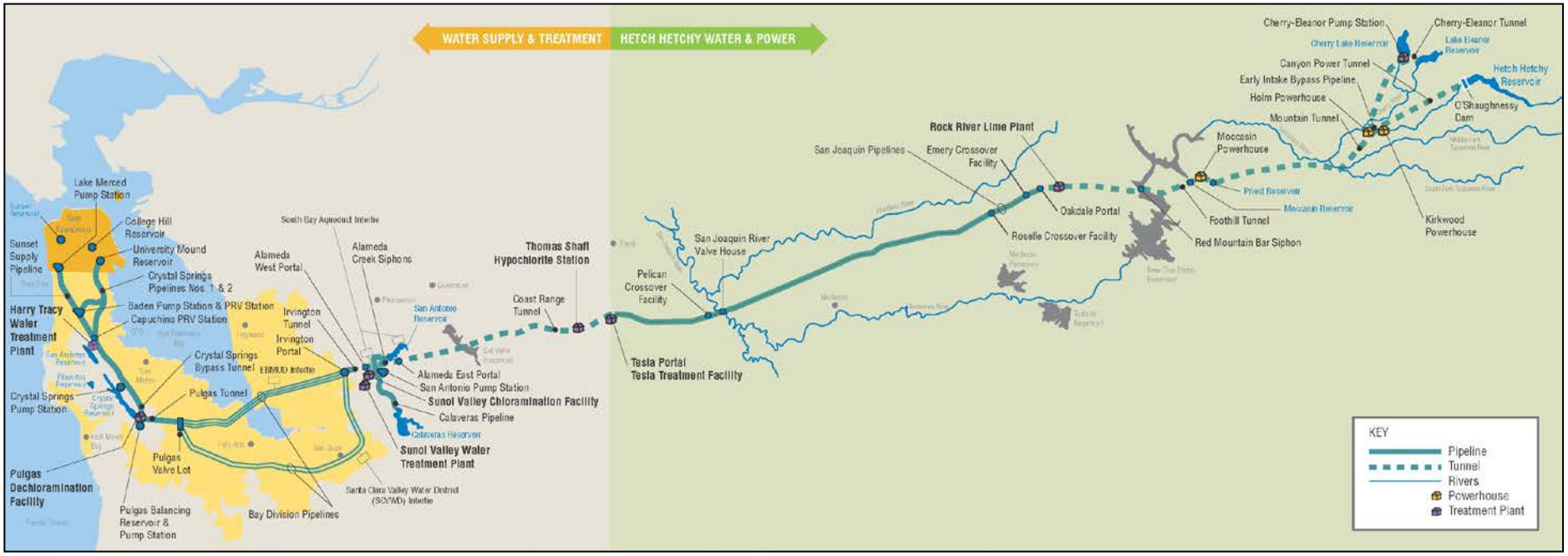
Focus of Learning Objective #2

- The Regional Water System (RWS) Map
- Water sources for the RWS
- The three main systems that make up the RWS
- The Treatment Facilities from Hetchy Hetchy to the City
- The departments responsible for operating and maintaining the Regional Water System

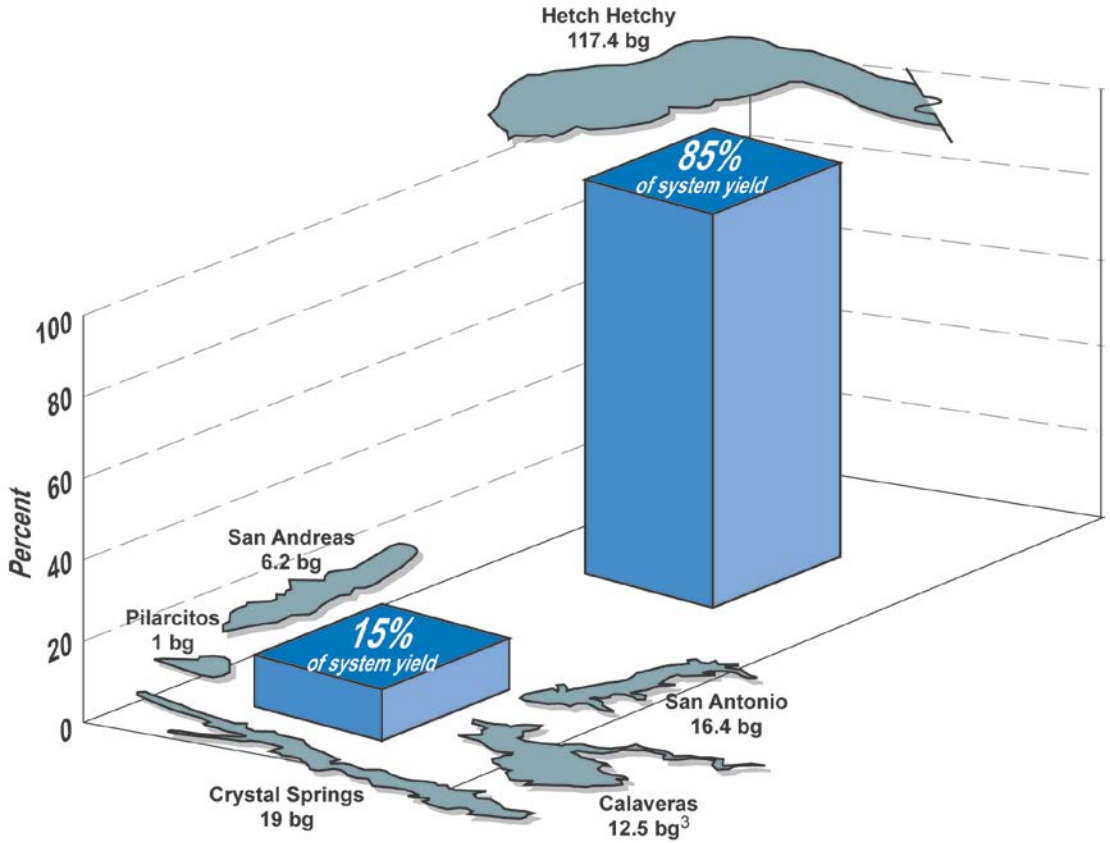


Hetch Hetchy Regional Water System

Regional Water System Map



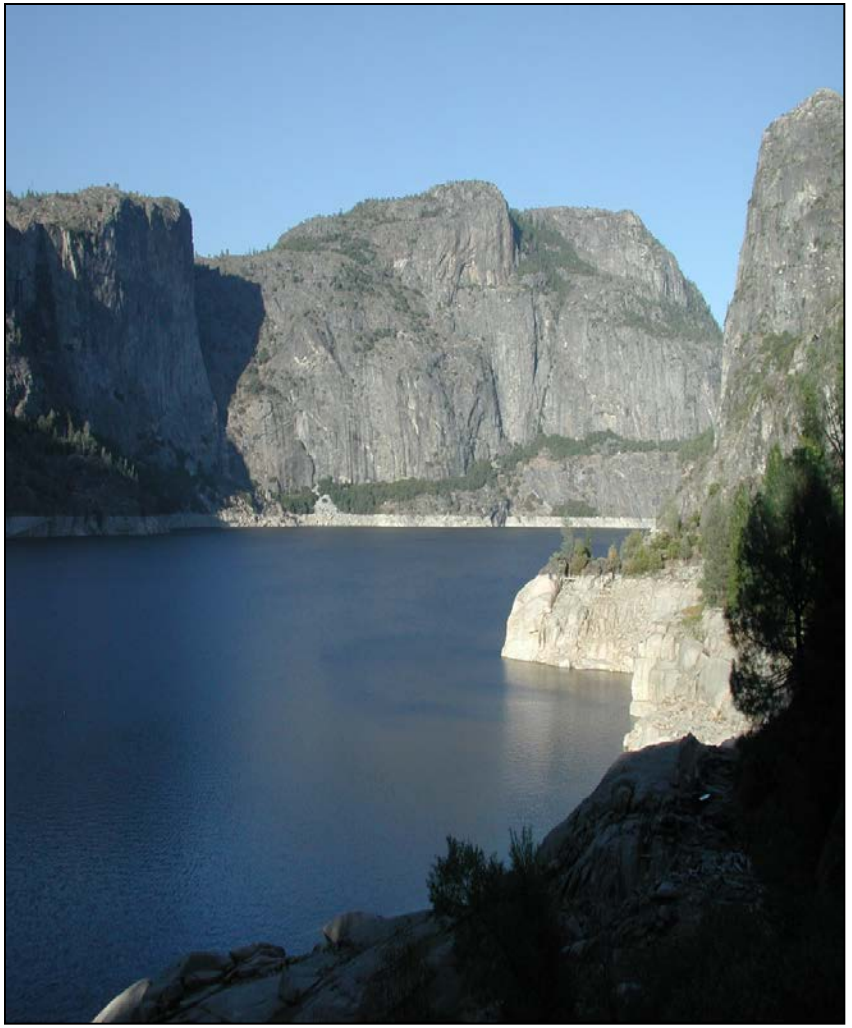
Sources of Supply



Notes: 1. Storage capacity of reservoirs shown in billion gallons (bg).
2. Although they account for 32% of the total system storage, local watersheds account for approximately 15% of the total system yield.
3. Per DSOD restrictions.

Hetch Hetchy Source

- Watershed Snowmelt Runoff
- Pristine Source = Filter Avoidance
- Gravity flow 150 miles to San Francisco
- 85% of System Yield



Hetch Hetchy Regional Water System

Local Sources of Supply

- Watershed Runoff into Local Reservoirs
- Requires Treatment as per Surface Water Treatment Rule
- 15% of System Yield

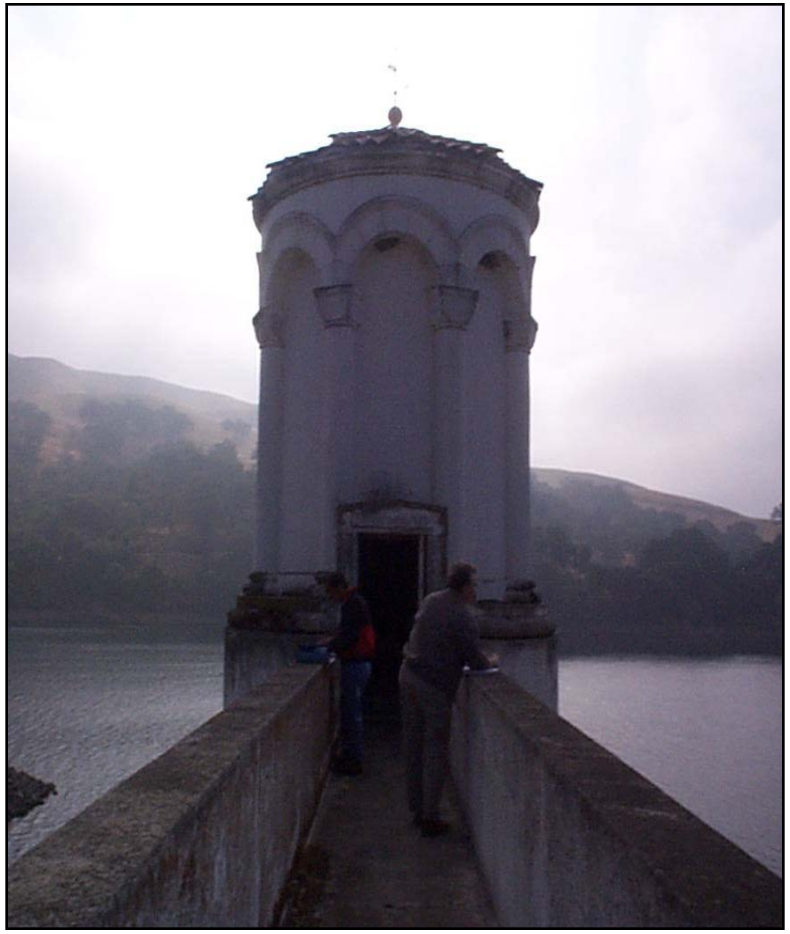
Systems & Local Watershed Sources

Systems

- Hetch Hetchy
- Alameda
- Peninsula

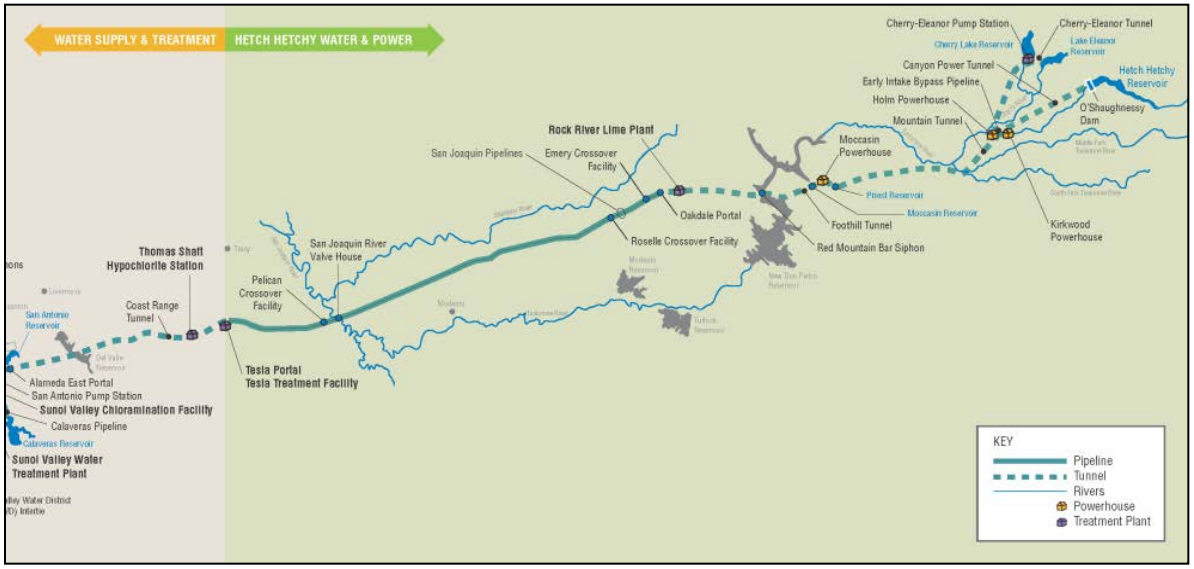
Local Watershed Sources

- Calaveras Reservoir
- San Antonio Reservoir
- Crystal Springs Reservoir
- San Andreas Reservoir
- Pilarcitos Reservoir

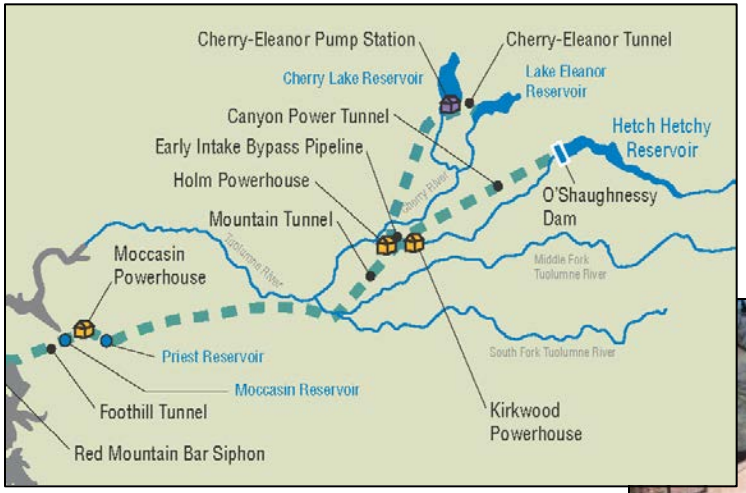


Hetch Hetchy Water and Power

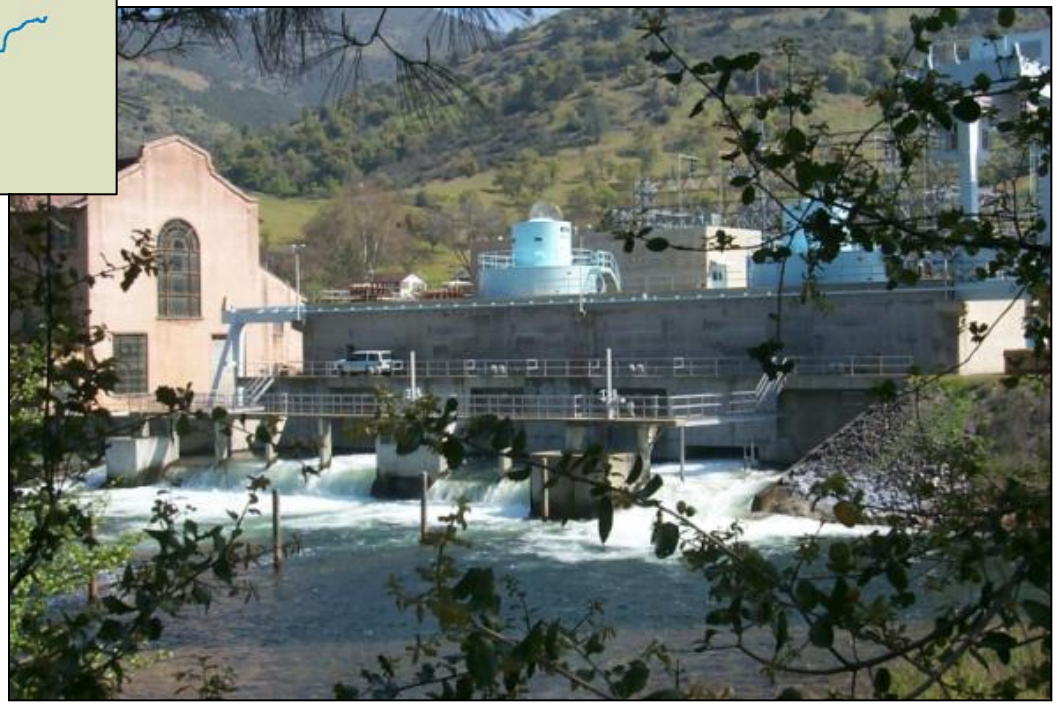
- Hydroelectric Power
- Operation and Maintenance
- Rock River Lime Plant
- System Monitoring



Hetch Hetchy Power

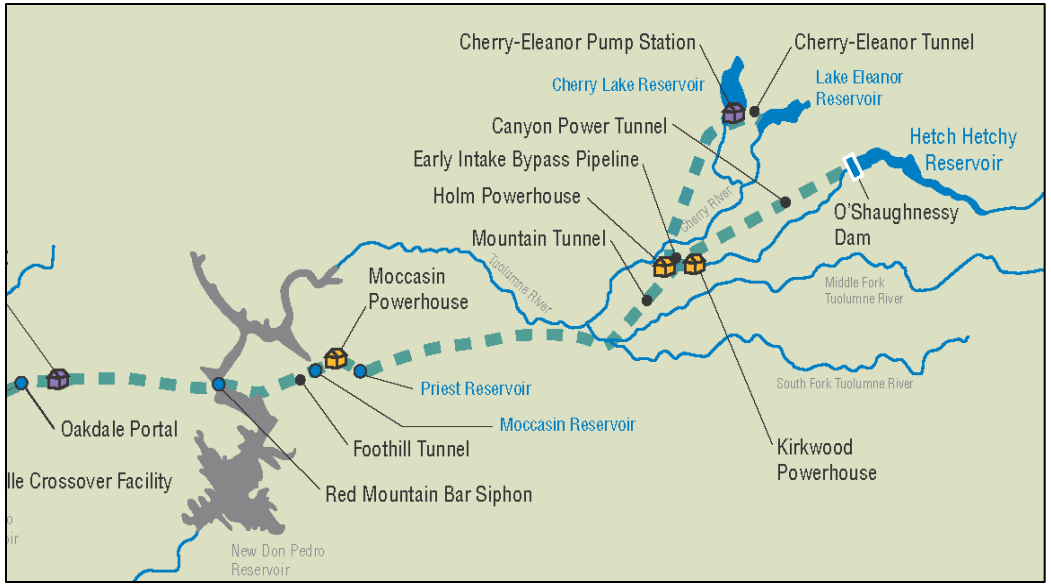


- Moccasin Powerhouse



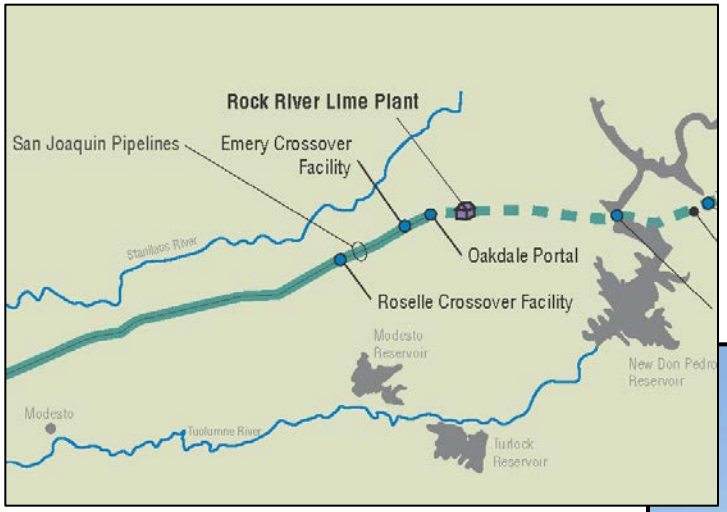
- Holm Powerhouse
- Kirkwood Powerhouse

The Hetch Hetchy System



- Lake Lloyd and Lake Eleanor
- Cherry – Eleanor Pump Station
- Hetch Hetchy and O'Shaughnessy Dam
- Canyon Power Tunnel
- Mountain Tunnel
- Priest Reservoir
- Moccasin Reservoir
- Red Mountain Bar Siphon
- Don Pedro Reservoir
- Foothill Tunnel

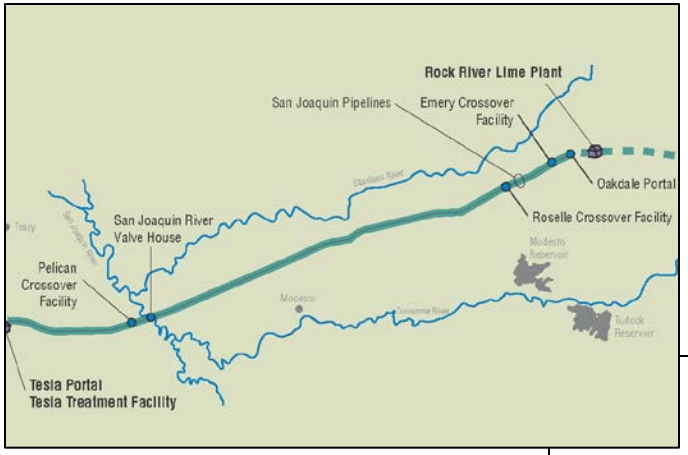
Rock River Lime Plant



- Adjusts the pH and Alkalinity of the Hetch Hetchy water supply

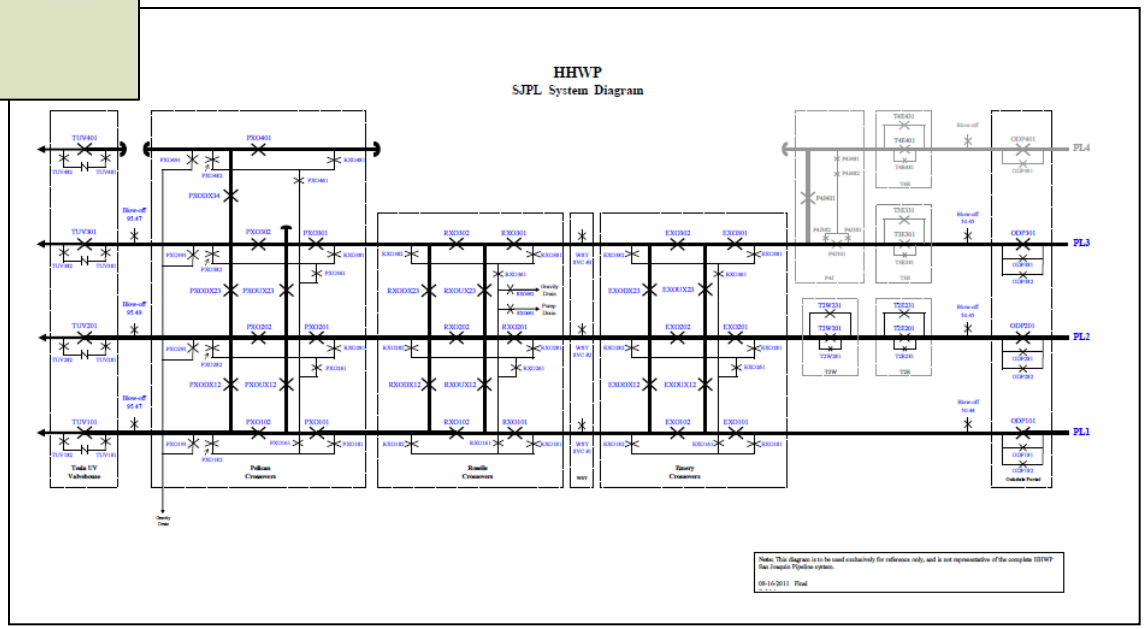
- Controls corrosion in the San Joaquin pipelines

San Joaquin Pipelines



- Oakdale Portal to Tesla Portal
- Monitoring Stations

- SJPL # 4
- Crossover Facilities

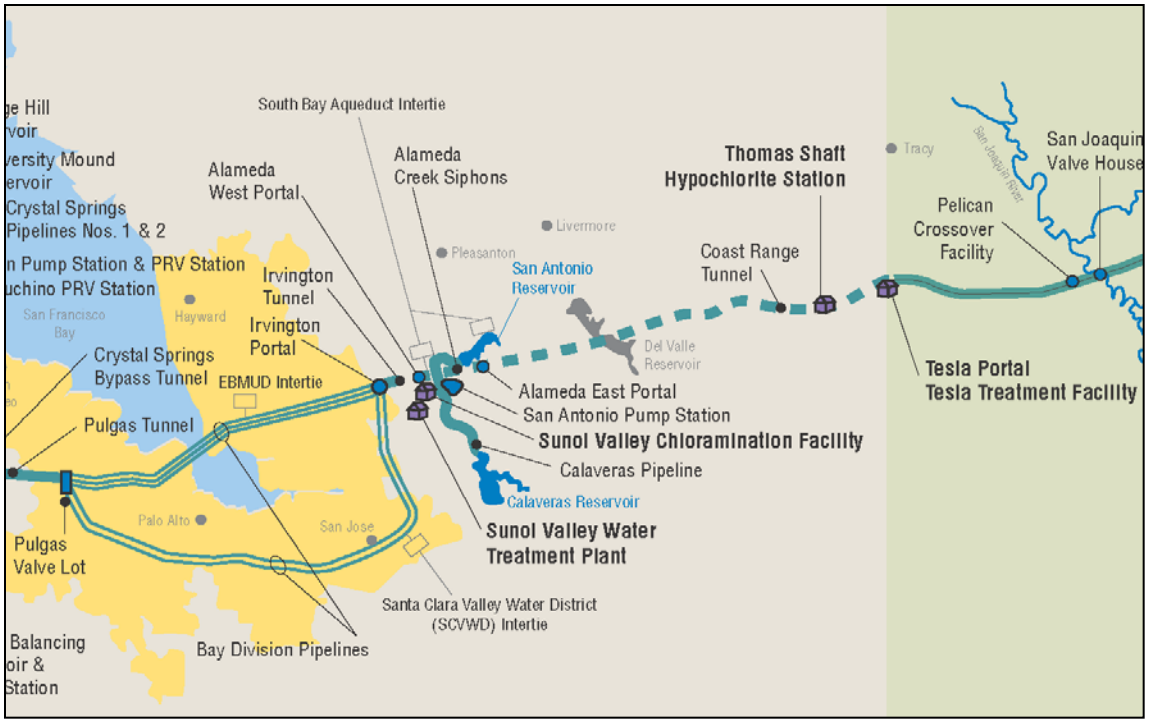


Hetch Hetchy Regional Water System

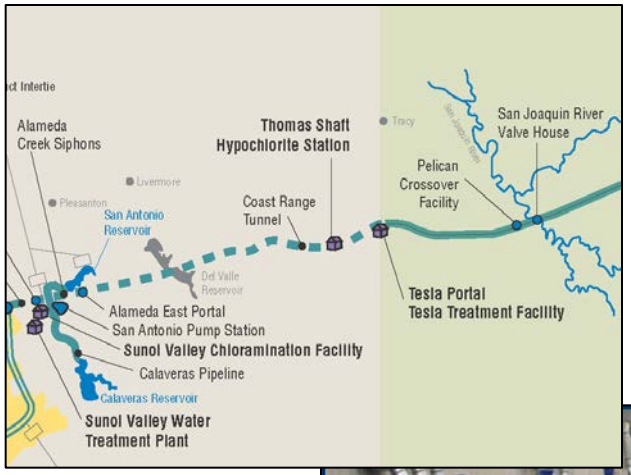
Break!

WS&T: East Bay Treatment

- East Bay Field Facilities
- Sunol Valley Water Treatment Plant
- SCADA

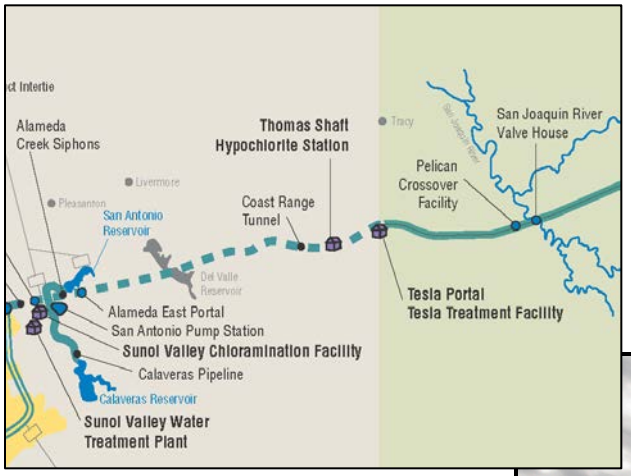


Tesla Treatment Facility



- UV facility capable of treating 315 MGD
- Treats Hetch Hetchy water

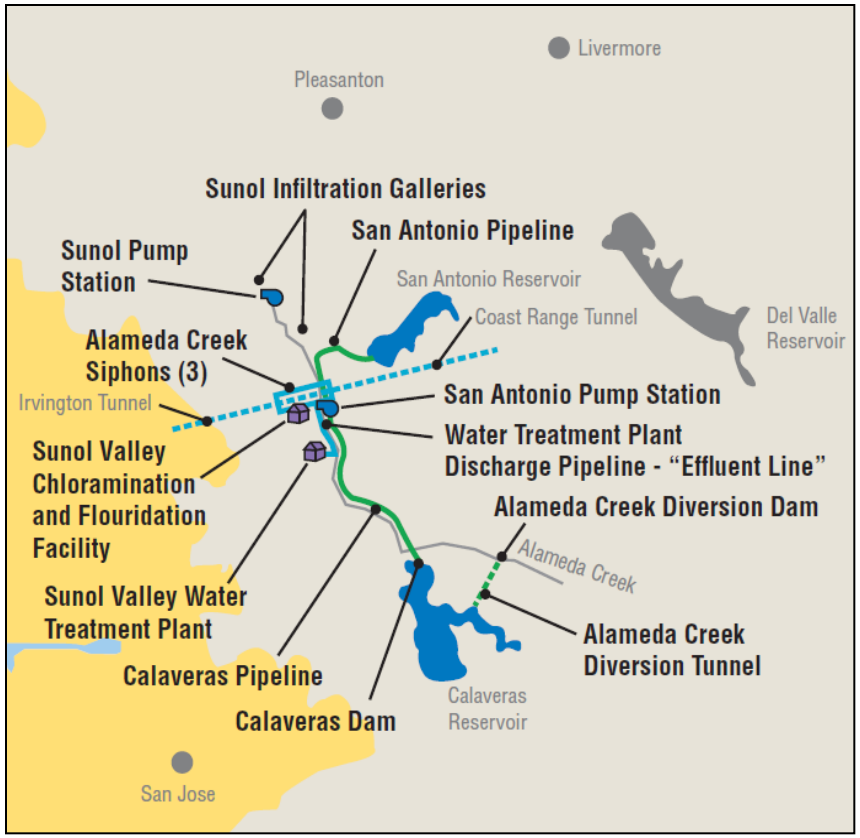
Thomas Shaft Chlorination Facility



- Backup Chlorination Facility
- Treats Hetch Hetchy water

Hetch Hetchy Regional Water System

Alameda System



- Calaveras and San Antonio Reservoirs
- Sunol Water Treatment Plant and Calaveras Pipeline
- San Antonio Pump Station and San Antonio Pipeline
- Sunol Valley Chloramination Facility and Alameda Siphons
- Sunol Infiltration Galleries
- Sunol Pump Station
- Alameda Creek Diversion Dam and Tunnel

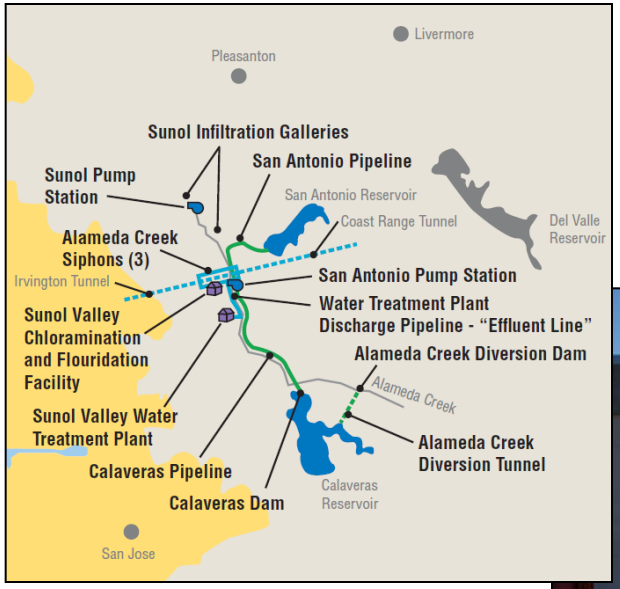
Calaveras Reservoir

- 12.4 BG DSOD Restriction
- Calaveras Dam Replacement Project
- Alameda Creek Diversion Dam

San Antonio Reservoir

- Turner Dam
- Sunol Pump Station
- South Bay Aqueduct

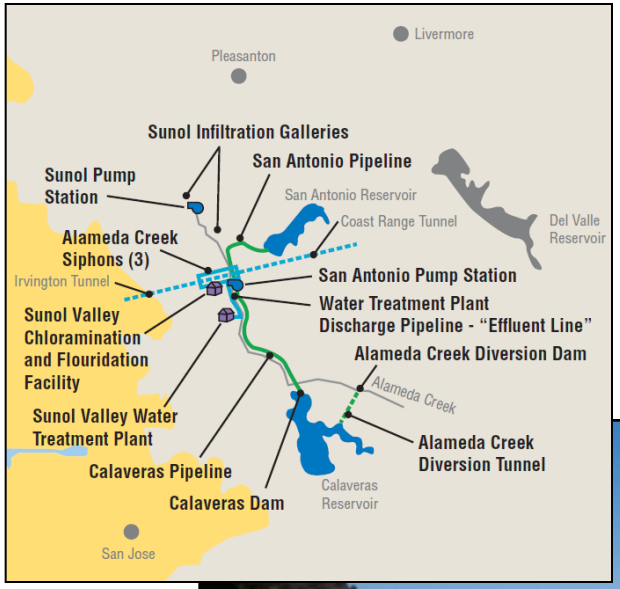
San Antonio Pump Station



- Capable of pumping 160 MGD to SVWTP or San Antonio Reservoir

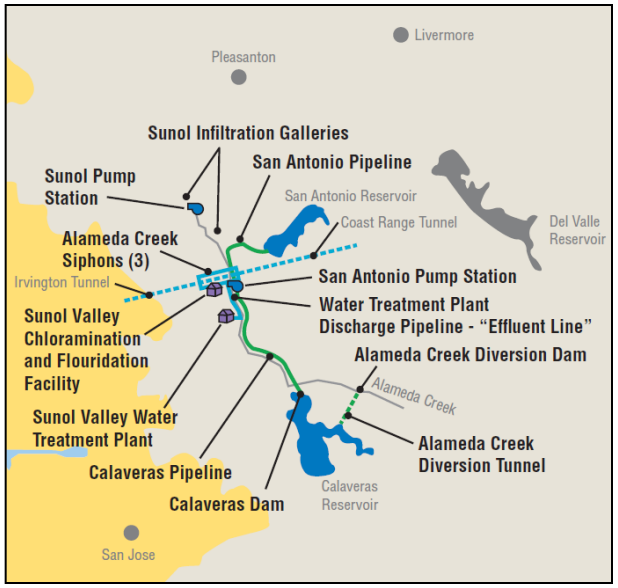
- Dechlorination Facility

Sunol Valley Water Treatment Plant



- Conventional Plant capable of treating 160 MGD
- Treats Calaveras, San Antonio and Hetch Hetchy water

Sunol Valley Chloramination Facility

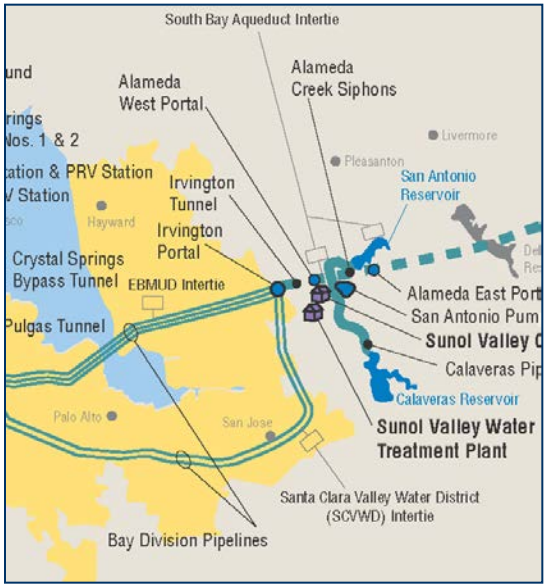


- Treats water from SVWTP and Hetch Hetchy

- Ammonia injection to produce Chloramines

- Alameda Siphons

Interconnections with Other Agencies



- South Bay Aqueduct

- Santa Clara Valley Water District
- East Bay Municipal Utility District

Hetch Hetchy Regional Water System

Questions & Discussion

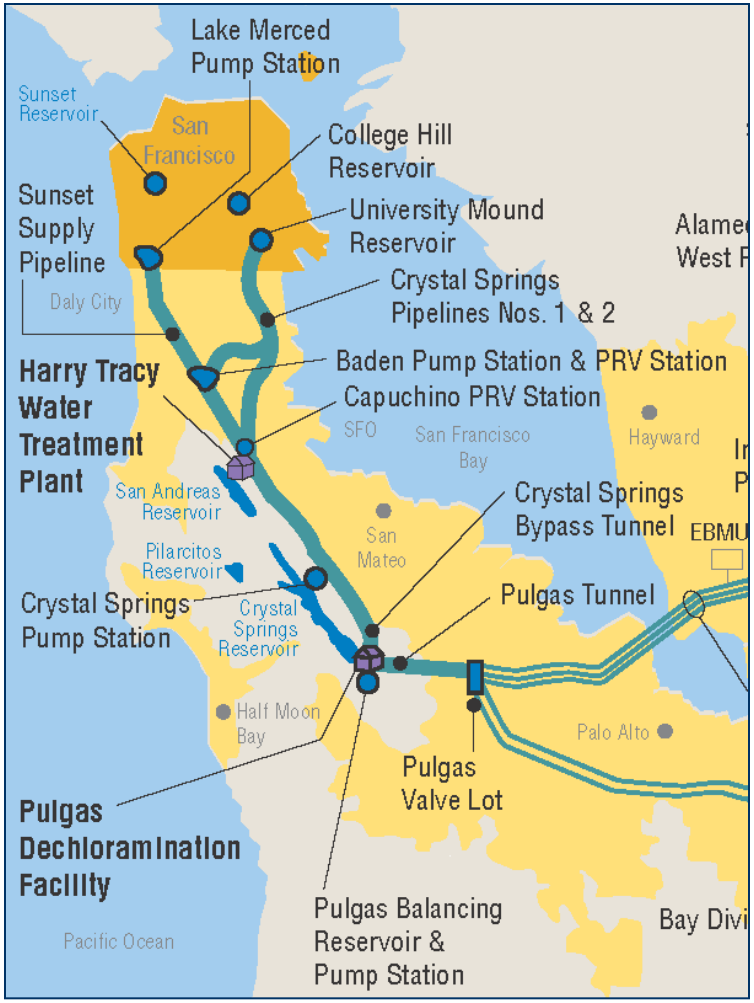
OR

Matching Exercise #1

Hetch Hetchy Regional Water System

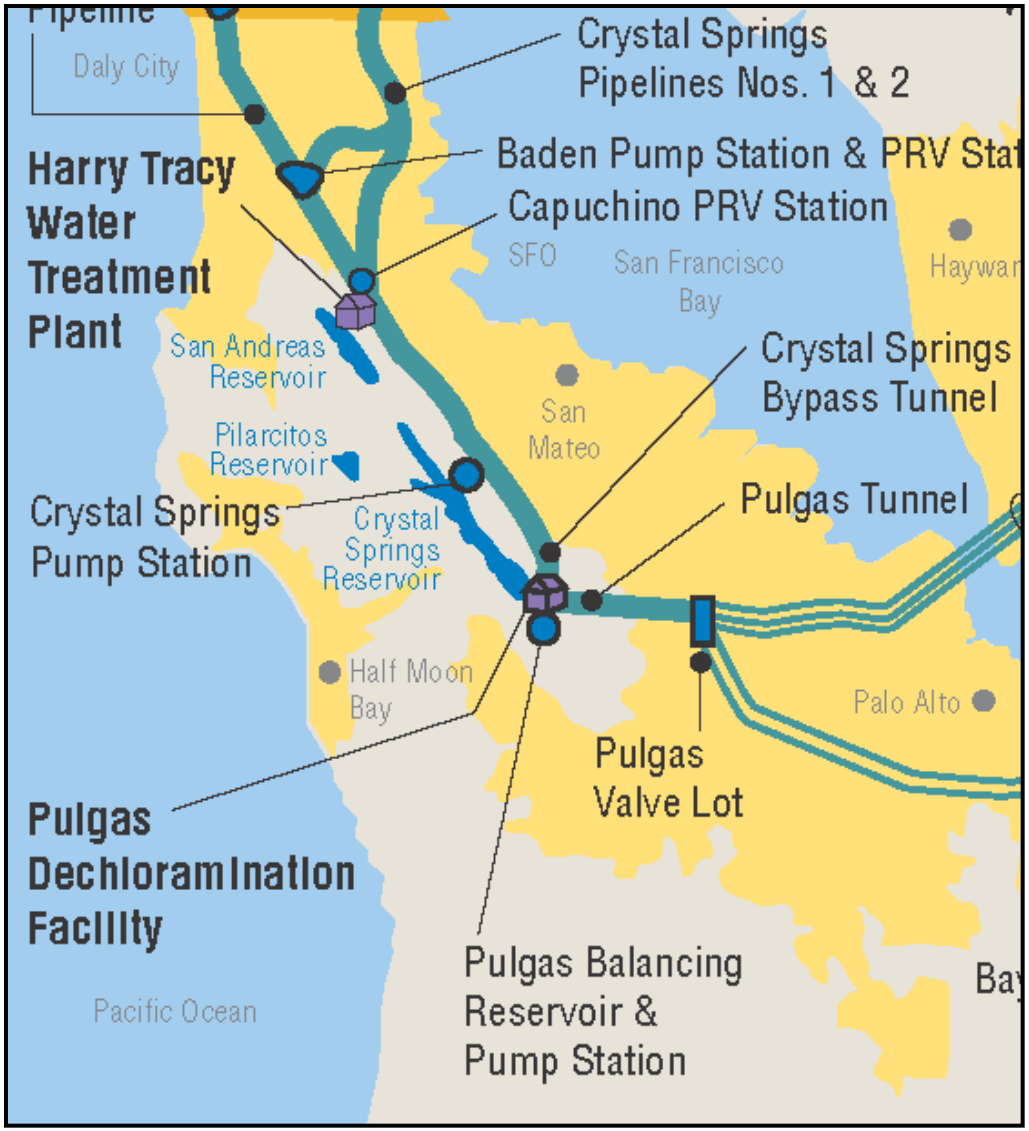
Peninsula System

- Pulgas Valve Lot
- Pulgas Pump Station
- Balancing Reservoir
- Pulgas Dechloramination Facility
- Baden Pump Station, PRV and Valve Lot



- Upper Crystal Springs Dam & Reservoir
- Lower Crystal Springs Dam & Reservoir
- Crystal Springs Pump Station
- San Andreas Reservoir
- Harry Tracy Filter Plant
- Capuchino Valve Lot
- San Pedro Valve Lot

WS&T: West Bay Treatment



Hetch Hetchy Regional Water System

Low Gradient Pressure Zone

Hetch Hetchy Regional Water System

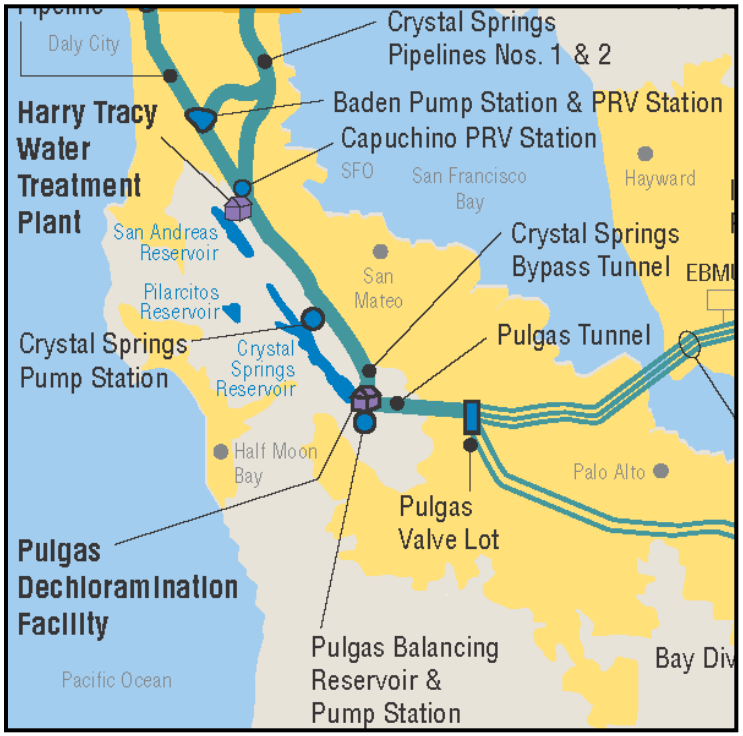
High Gradient Pressure Zone

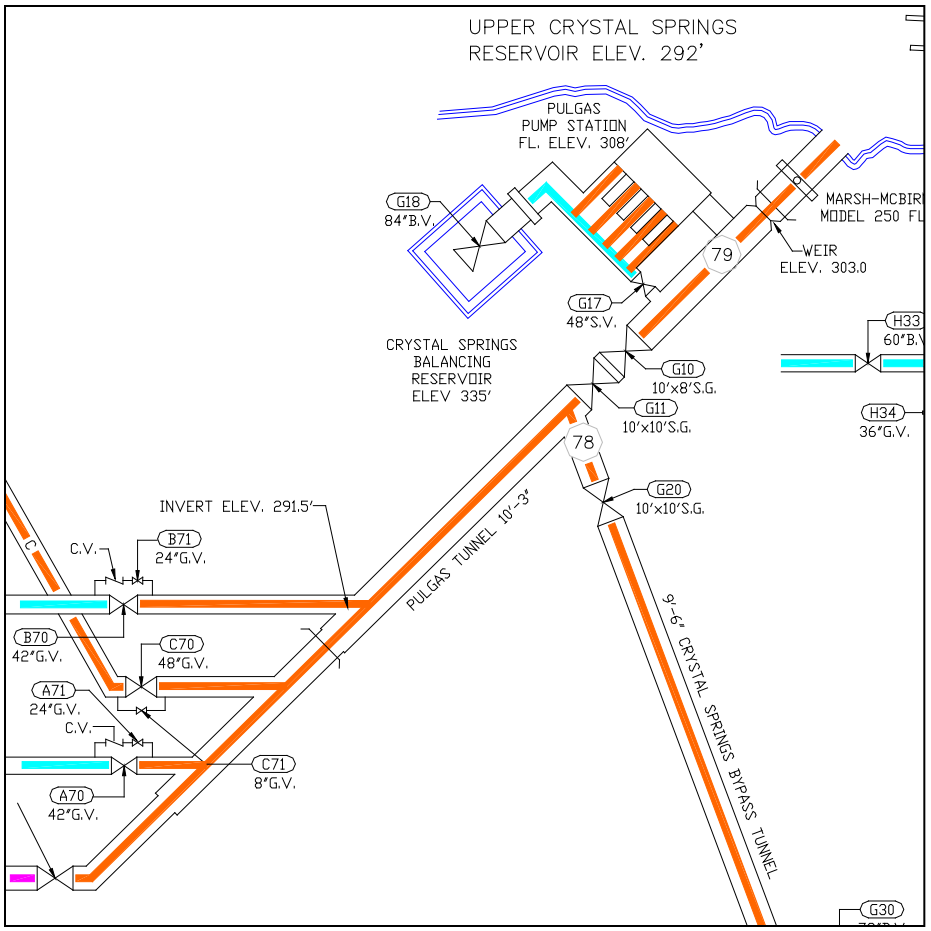
Pulgas Valve Lot

- West end of Bay Division Pipe Lines
- East portal of Pulgas Tunnel
- Water quality monitoring location
- Located near Edgewood Rd and Crestview in Redwood City

Hetch Hetchy Regional Water System

Pulgas Tunnel





- Constructed 1925
- Length: 1.89 miles
- Connects Bay Division Pipe Lines to Crystal Springs Bypass Tunnel, Pulgas facilities, and Crystal Springs Reservoir

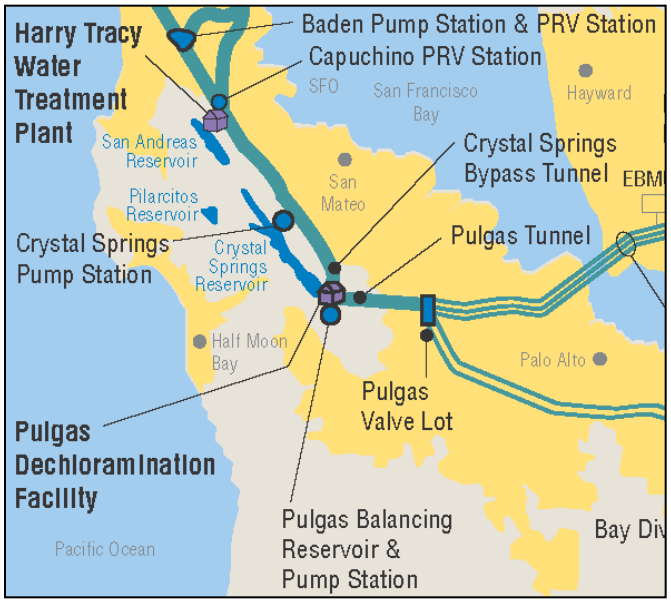
Pulgas Balancing Reservoir

- Capacity is 60 MG
- Built in 1975
- Supplements the system during peak demand periods
- Located across from the Pulgas Dechlor Facility
- WSIP Improvements in 2011

Pulgas Pump Station

- Pumps water from the Pulgas Pump Station wet well to refill the Balancing Reservoir
- Five vertical shaft turbines
- Located near Pulgas Temple along Canada Road, San Mateo

Pulgas Dechloramination Facility



- Removes chlorine and ammonia
- Balances pH
- Releases excess water to Upper Crystal Springs Reservoir

Upper Crystal Springs Reservoir and Dam

- Sources:
  - Hetch Hetchy - East Bay blend water
  - Local watershed
- Dam is roadbed for Hwy 92 (San Mateo to HMB)
- Upper and Lower Reservoirs are inter-connected under Hwy 92

Lower Crystal Springs Reservoir Dam and Pump Station

- Sources:
  - Local Watershed
  - Hetch Hetchy – East Bay blend water
- Water is pumped to San Andreas Reservoir via the Crystal Springs Pump Station
- Lower Crystal Springs Dam was built between 1888-90

San Andreas Reservoir and Dam

- Earthen fill dam

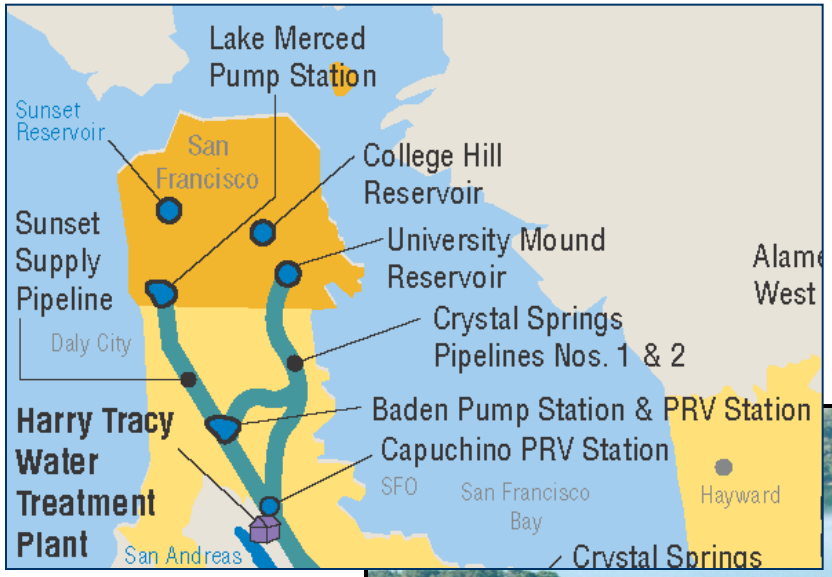
Sources:

- Local Watershed
- Crystal Springs Reservoir via the Crystal Springs Pump Station

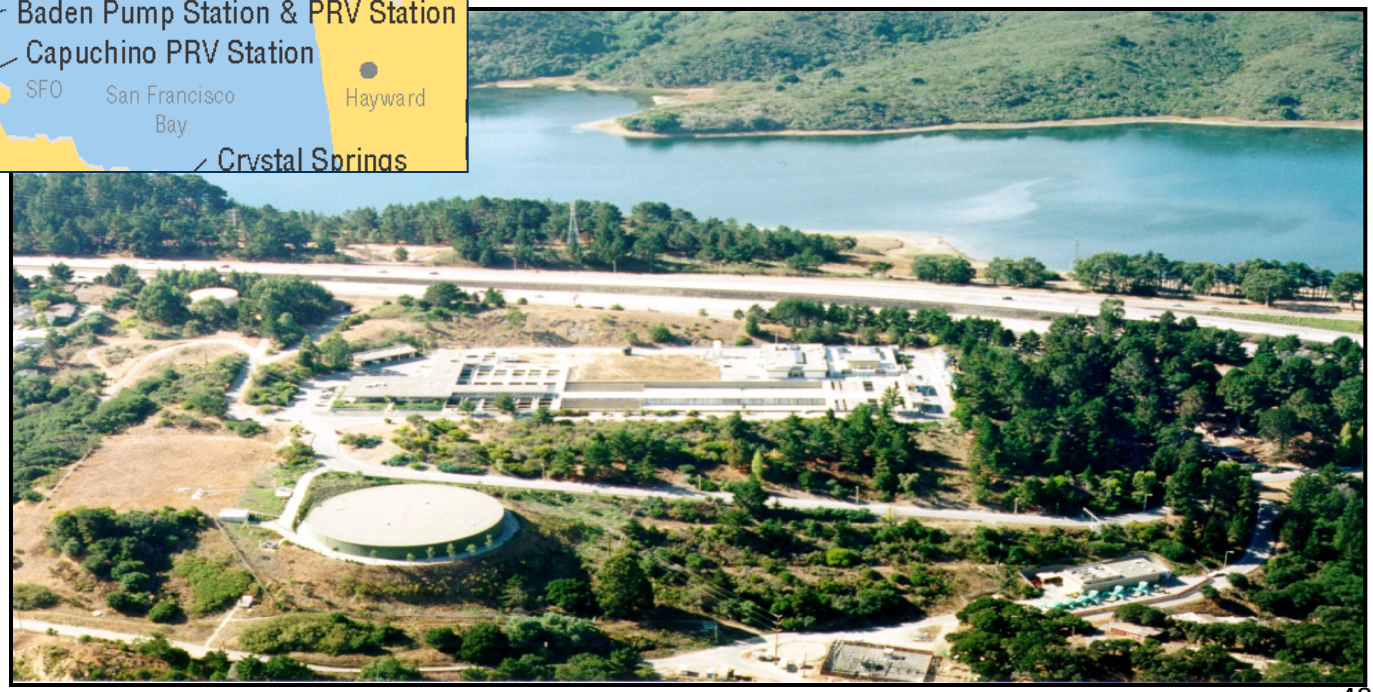
Hetch Hetchy Regional Water System

High Gradient Pressure Zone

Harry Tracy Water Treatment Plant



- Direct Filtration Plant capable of treating 160 MGD
- Treats water from the San Andreas Reservoir

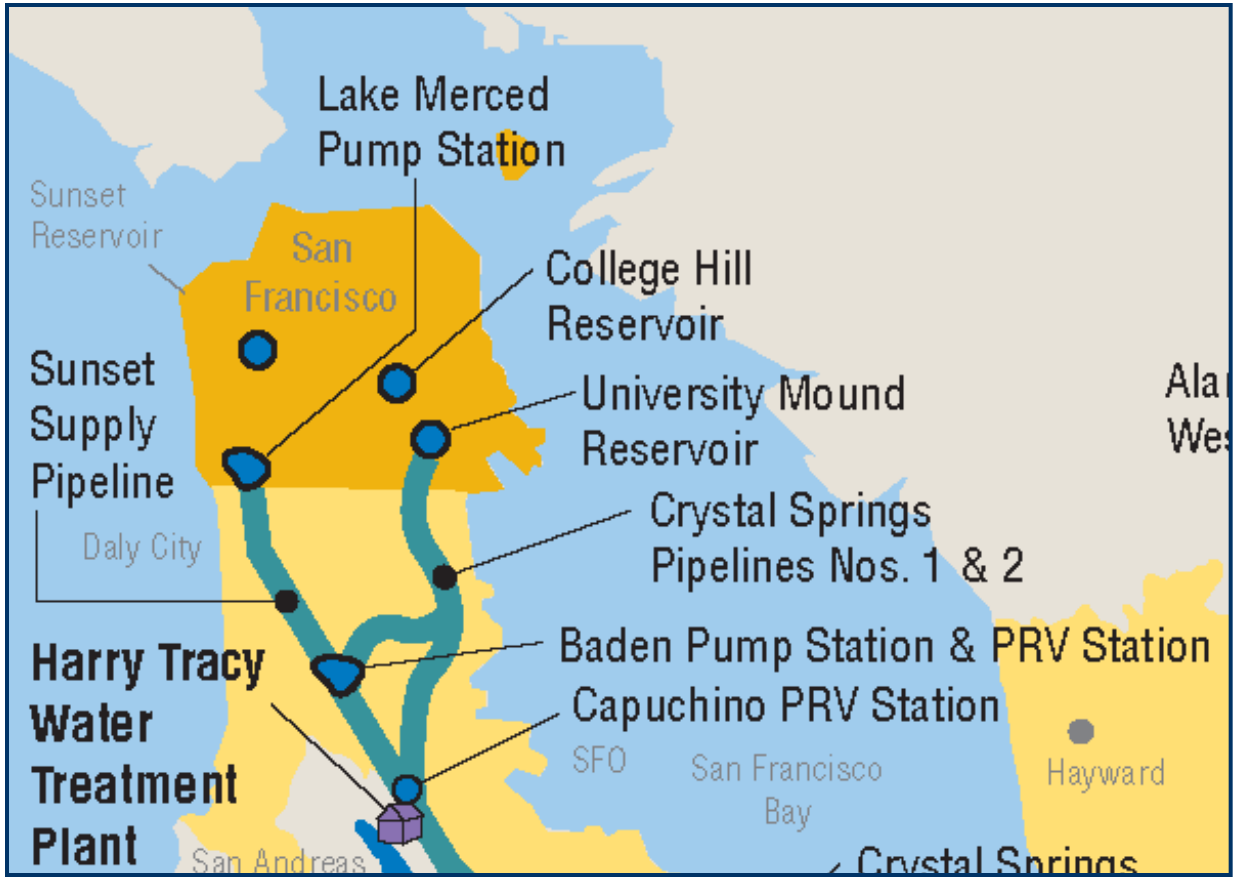


Hetch Hetchy Regional Water System

Questions

Low Zone/High Zone Interconnections

- Capuchino Pressure Reducing Station
- Baden Pump Station and Valve Lot



Capuchino Pressure Reducing Station

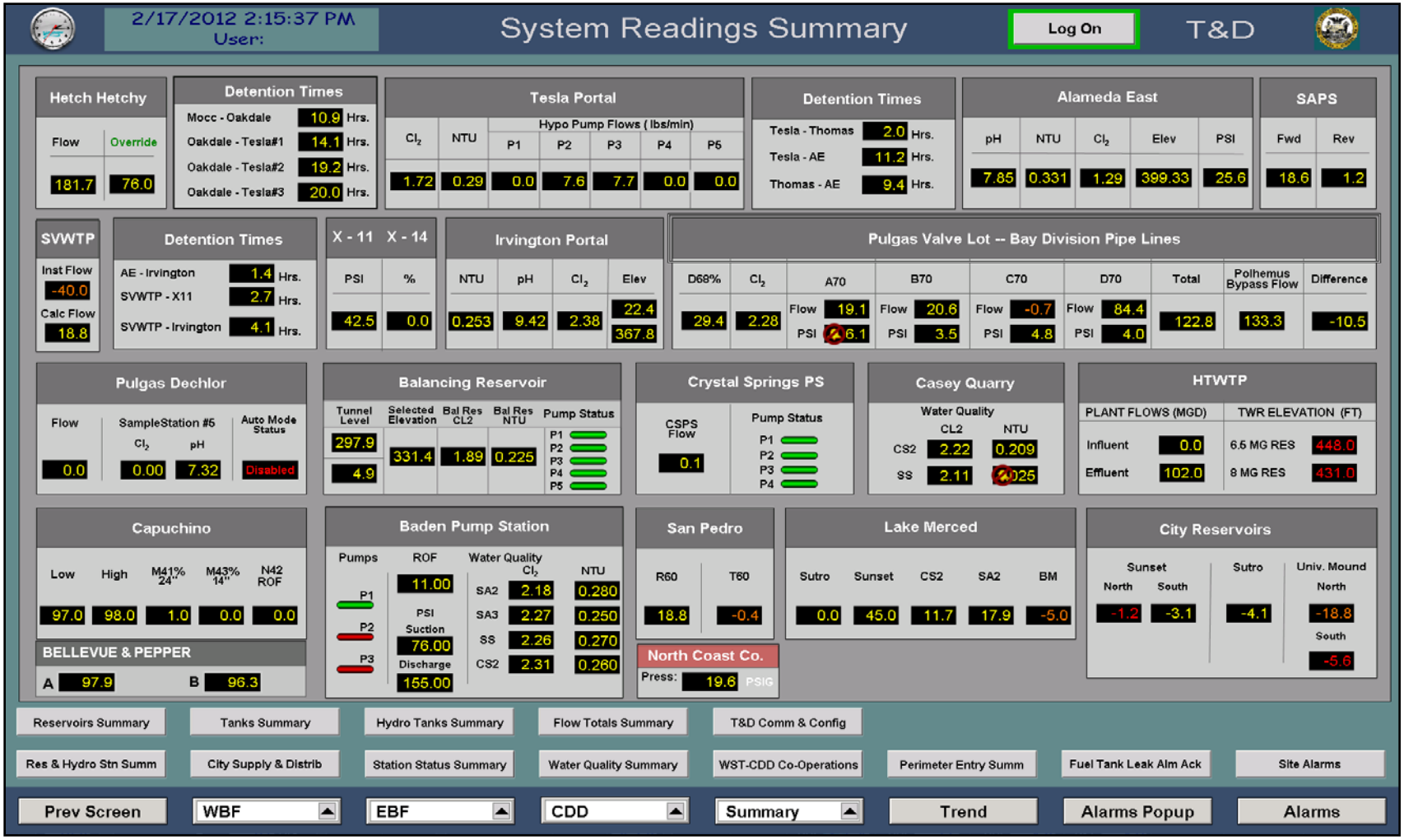
- Water transferred from the high zone to the low zone
- Capacity of 80 MGD

Baden Pump Station and Valve Lot

- Water pumped from the low zone to the high zone
- High to low gradient PRV Station/Facility at a maximum capacity of 80 MGD

Hetch Hetchy Regional Water System

SCADA



SCADA Overview

- Stands for Supervisory Control and Data Acquisition
- Supplies real time water supply and water quality data from critical facilities.
- Three Operation Control Centers (OCCs): SVWTP, HTWTP and LMPS.
- OCCs manned 24/7
- Controls system pumps, chemical injection and valve movement remotely from OCCs.

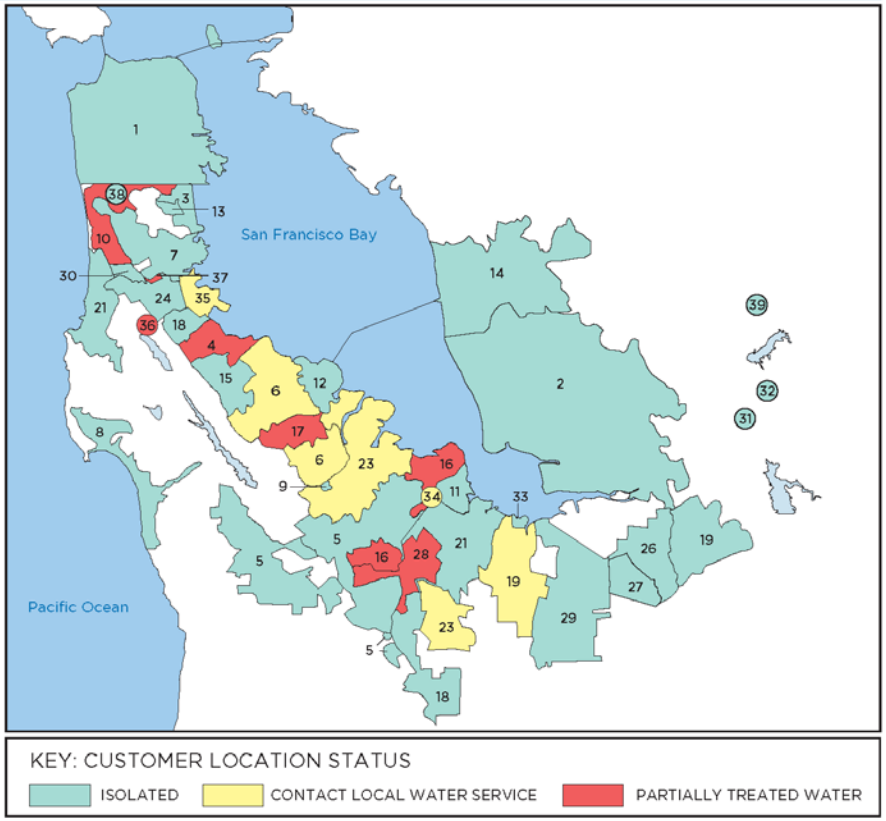
SFPUC Water System Customers

SYSTEM STATUS MAP

Hetch Hetchy Regional Water System - Wholesale/Retail Customers

#	CUSTOMER LOCATION		STATUS
1	San Francisco		
2	Alameda County Water District	WHOLESALE	
3	City of Brisbane	WHOLESALE	
4	City of Burlingame	WHOLESALE	
5	Cal Water Service Co. / Bear Gulch	WHOLESALE	
6	Cal Water Service Co. / Mid-Peninsula	WHOLESALE	
7	Cal Water Service Co. / SSF	WHOLESALE	
8	Coastside County Water District	WHOLESALE	
9	Cordilleras Mutual Water District	WHOLESALE	
10	City of Daly City	WHOLESALE	
11	City of East Palo Alto	WHOLESALE	
12	Estero Municipal Improvement District	WHOLESALE	
13	Guadalupe Valley Municipal Improvement District	WHOLESALE	
14	City of Hayward	WHOLESALE	
15	Town of Hillsborough	WHOLESALE	
16	City of Menlo Park	WHOLESALE	
17	Mid-Peninsula Water District	WHOLESALE	
18	City of Millbrae	WHOLESALE	
19	City of Milpitas	WHOLESALE	
20	City of Mountain View	WHOLESALE	
21	North Coast County Water District	WHOLESALE	
22	City of Palo Alto	WHOLESALE	
23	Purissima Hills Water District	WHOLESALE	
24	City of Redwood City	WHOLESALE	
25	City of San Bruno	WHOLESALE	
26	City of San Jose Municipal Water System, North*	WHOLESALE	
27	City of Santa Clara	WHOLESALE	
28	Stanford University	WHOLESALE	
29	City of Sunnyvale	WHOLESALE	
30	Westborough Water District	WHOLESALE	
31	Town of Sunol	RETAIL	
32	Vallecitos	RETAIL	
33	NASA - Ames Moffet Field	RETAIL	
34	Menlo Country Club	RETAIL	
35	SFO	RETAIL	
36	SF County Jail	RETAIL	
37	Golden Gate National Cemetery	RETAIL	
38	Lake Merced Country Club	RETAIL	
39	Lawrence Livermore Laboratory	RETAIL	

*serves a portion of identified agency



FOR MAP MODIFICATIONS CONTACT SFPUC COMMUNICATIONS: graphics@sfwater.org

Hetch Hetchy Regional Water System
Services of the San Francisco Public Utilities Commission

DATE ISSUED: 04/24/2012

Hetch Hetchy Regional Water System

City Distribution Division

Hetch Hetchy Regional Water System

Questions & Discussion

OR

Matching Exercise #2

Summary of Learning Objective #2

- The Regional Water System (RWS) Map
- Two Primary Water Sources for the RWS
- The three main systems that make up the RWS
- The Treatment Facilities from Hetchy Hetchy to the City
- The departments responsible for operating and maintaining the Regional Water System

Hetch Hetchy Regional Water System

Moving on to..

Learning Objective #3: Learning to make decisions based on operational factors

Hetch Hetchy Regional Water System

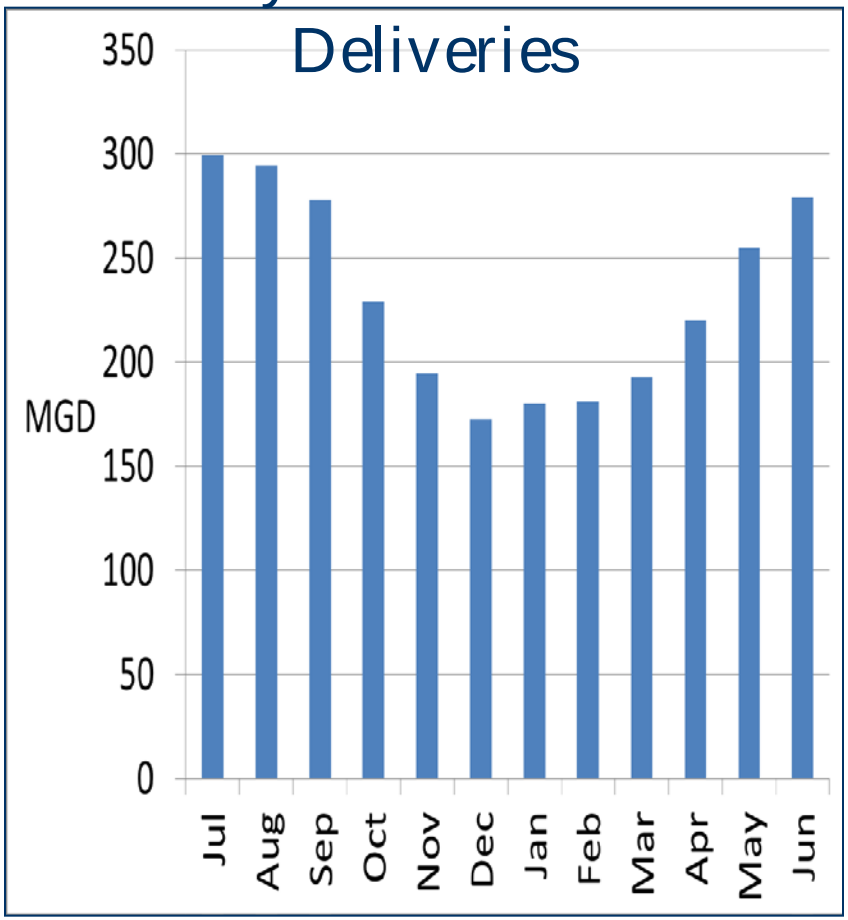
- Goals
- Constraints
- Strategies
- Transfers

Goals

- Meet Demand with Available Sources
- Maintain Filtration Exemption
- Local Reservoir Management

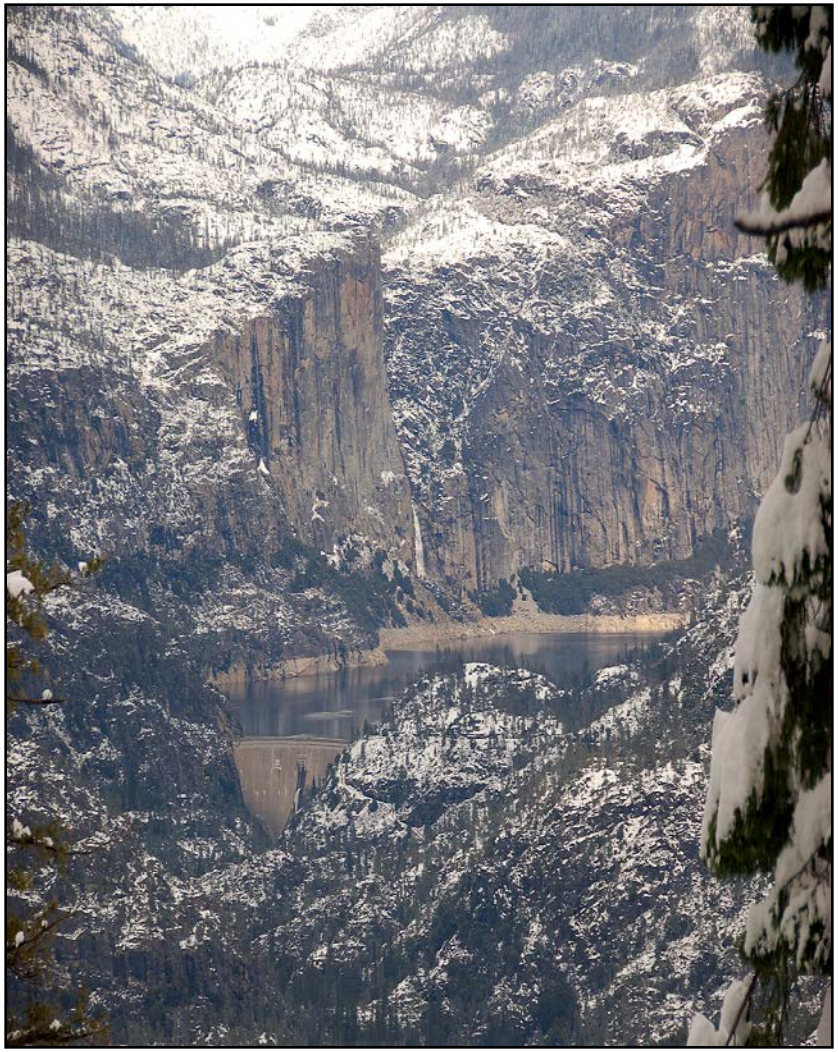
Goal #1-- Meeting Demands

- **Demand:** 250 MGD average
- **Sources:**
  - Hetch Hetchy: 315 MGD
  - SVWTP: 160 MGD
  - HTWTP: 160 MGD
- SCVWD Intertie: 40 MGD
- EBMUD Intertie: 30 MGD



Goal #2-- Filtration Exemption (FE)

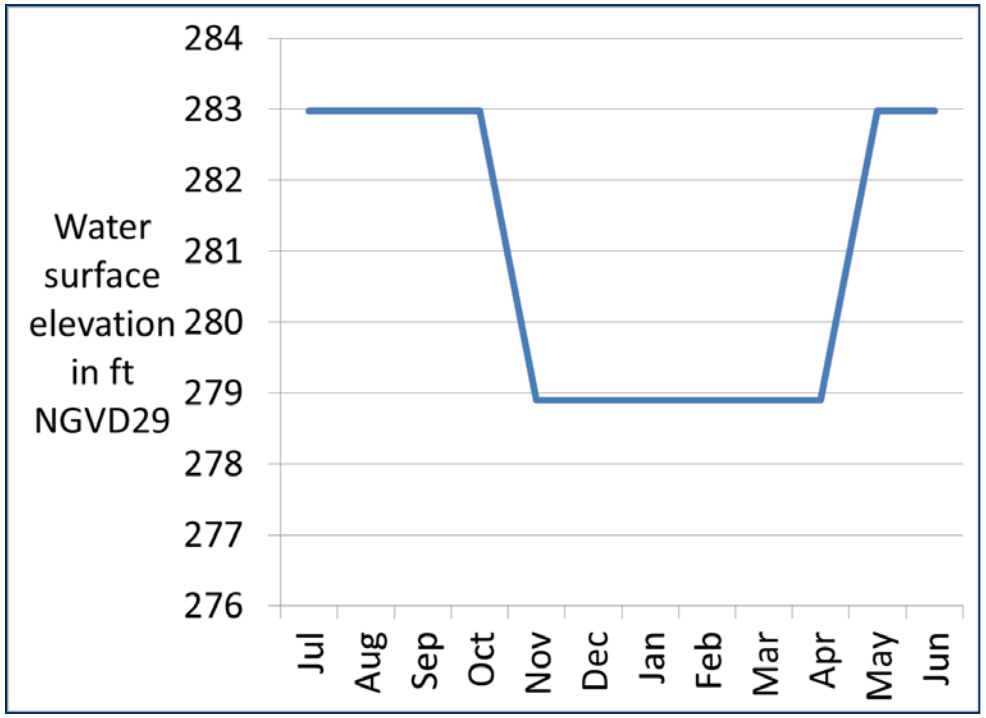
- Must meet RWS permit stipulations
- Tesla Treatment Facility, Thomas Shaft all built to support FE



Goal #3-- Local Reservoir Management

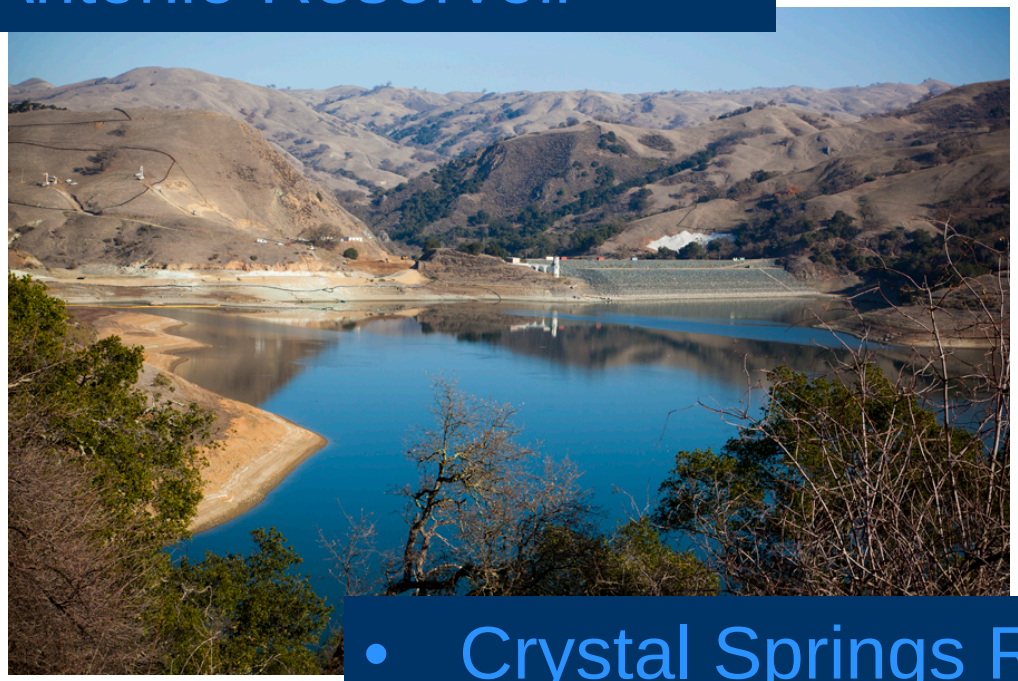
- Maximize storage
- Minimize chance of spill
- Capture late spring runoff
- Drawdown in Summer

Crystal Springs Rule Curve



Goal #3– Management of Local Reservoirs

- Calaveras Reservoir
- San Antonio Reservoir



- Crystal Springs Reservoir
- San Andreas Reservoir
- Pilarcitos Reservoir

Calaveras Reservoir

- Built 1913-1925
- Largest Local Reservoir
- Catchment Area 100 sq mi
- 31.5 BG storage

San Antonio Reservoir

- Built 1966
- Catchment Area 40 sq mi
- 16.5 BG storage
- Accepts Calaveras and HH transfers

Crystal Springs Reservoir

- Upper; built 1877 | Lower; built 1888
- Catchment Area 22.5 sq mi
- Total storage: 22.6 BG
- Coastside County WD source

San Andreas Reservoir

- Built 1868-70
- Catchment Area 4.4 sq mi
- 6.2 BG storage
- HTWTP source water
- Transfers from Crystal Springs Reservoir

Pilarcitos Reservoir

- Built 1866
- Catchment Area 3.8 sq mi
- 1BG storage
- CCWD Supply

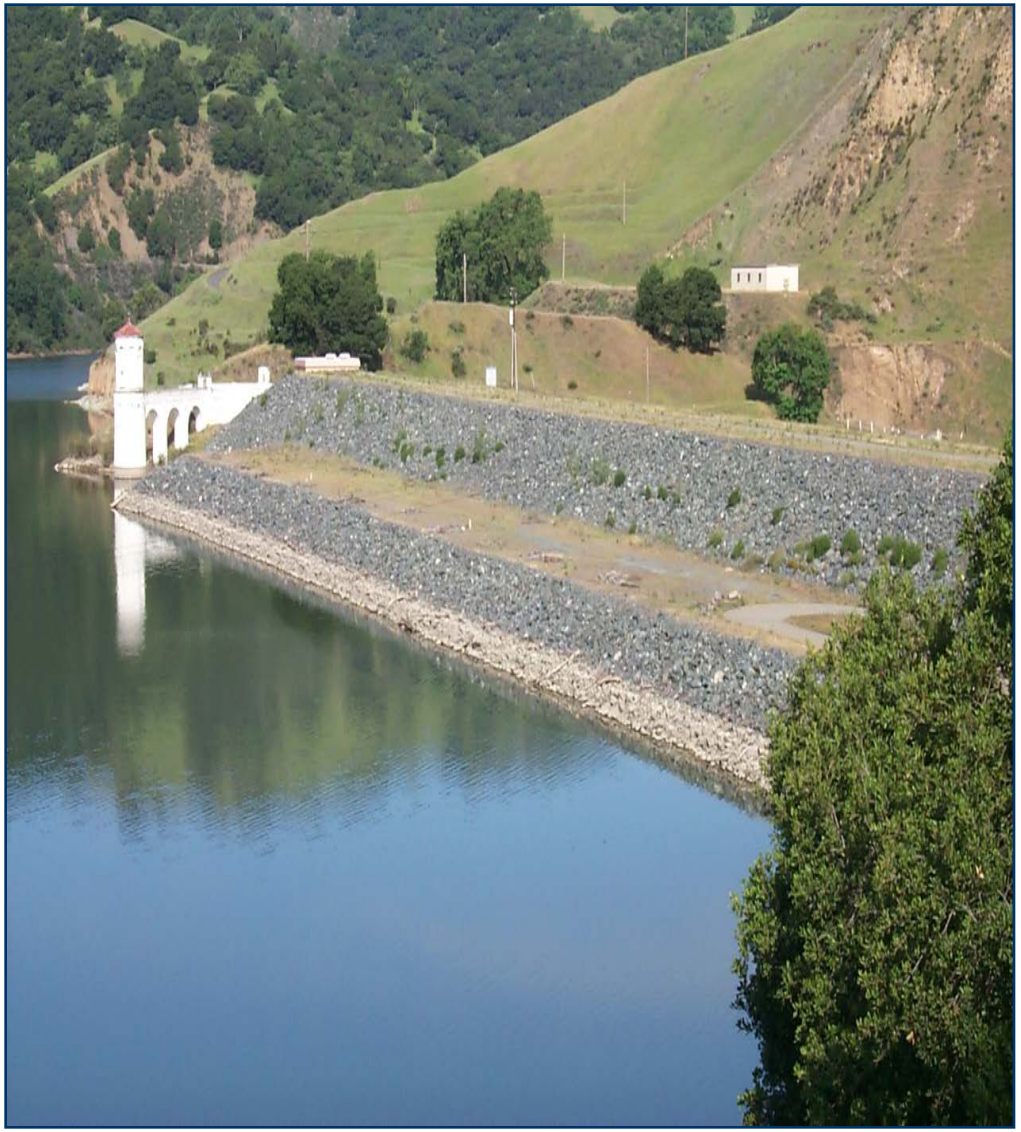
Hetch Hetchy Regional Water System

Questions & Discussion

Hetch Hetchy Regional Water System

System Constraints

- DSOD Restrictions
- Raker Act
- Regulatory Drivers
- Physical Constraints
  - BDPL capacity
  - Treatment Plant availability



Hetch Hetchy Regional Water System

Operating Strategies

- Seasonal
  - Rule Curve
- Day to Day
  - Setting rates

Hetch Hetchy Regional Water System

System Transfers

- HH to SAR
- CAR to SAR
- HH to CSR
- Interties
- SBA to SAR
- Sunol Filter Galley to SAR
- CSR to San Andreas

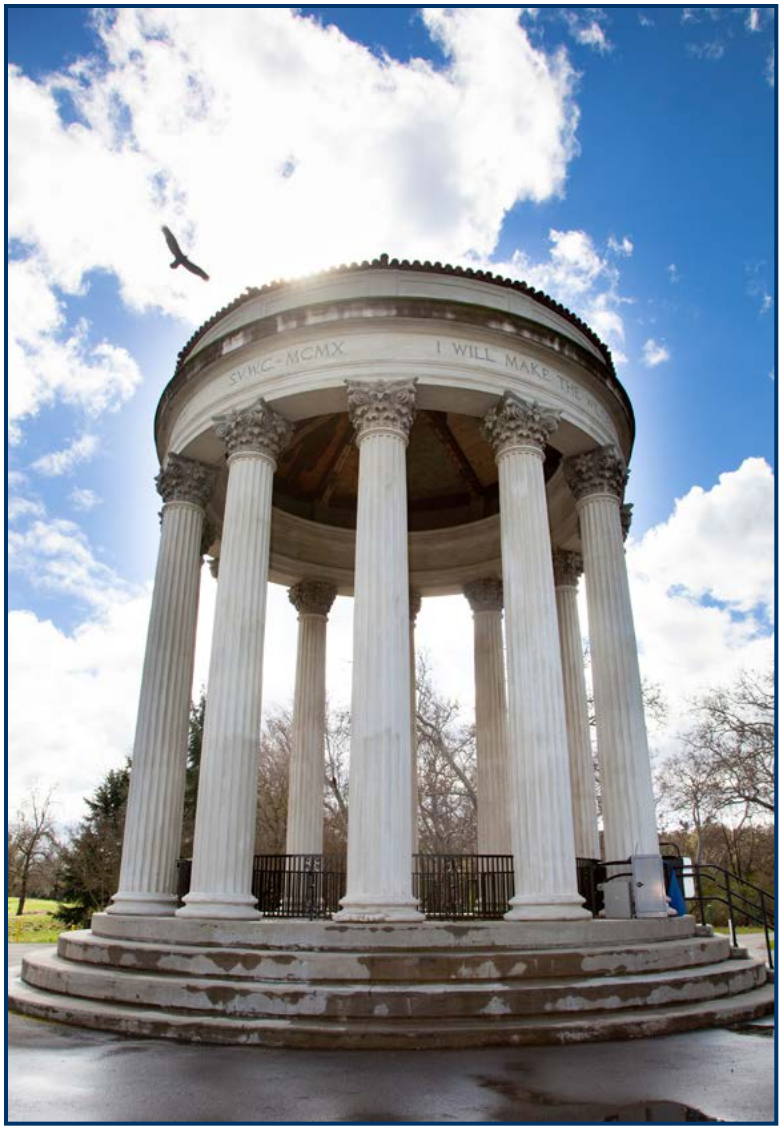
Plan Development

- Goal
- Constraints
- Risks
- Contingencies

Hetch Hetchy Regional Water System

Post-Test

Hetch Hetchy Regional Water System

Summary

- Introduction and Overview
- Pre-Test
- Learning Objectives
- Post-Test
- **Evaluations**