

Regional Water System Training



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



Pre-Test

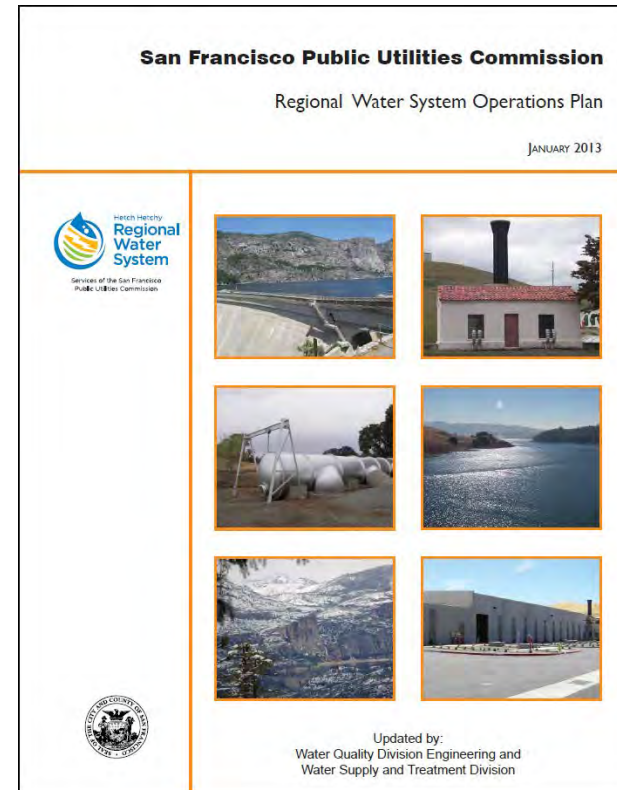
Moving on to..

Learning Objective #1

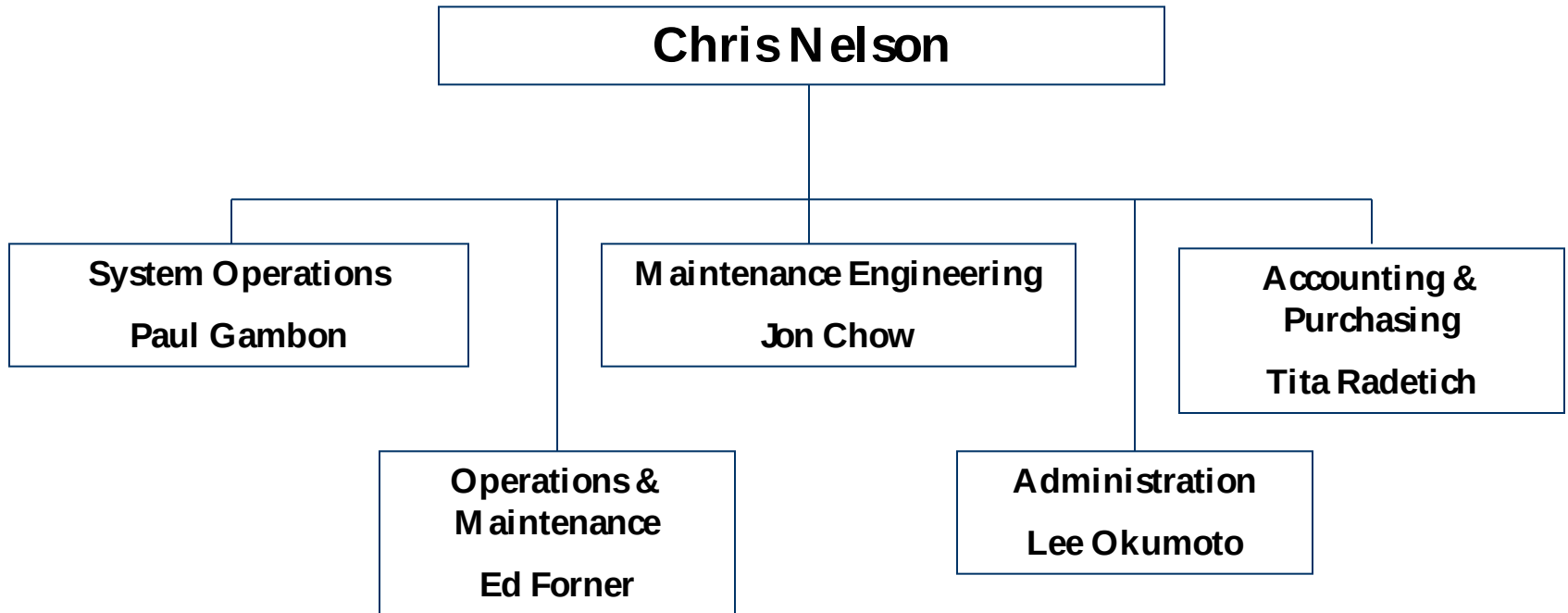
***Become familiar with the Regional
Water System Operations (Ops)
Plan and SFPUC organization***

Introduction to RWS Ops Plan

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



Water Supply & Treatment Division



Learning Objective #2

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

Focus of Learning Objective #2

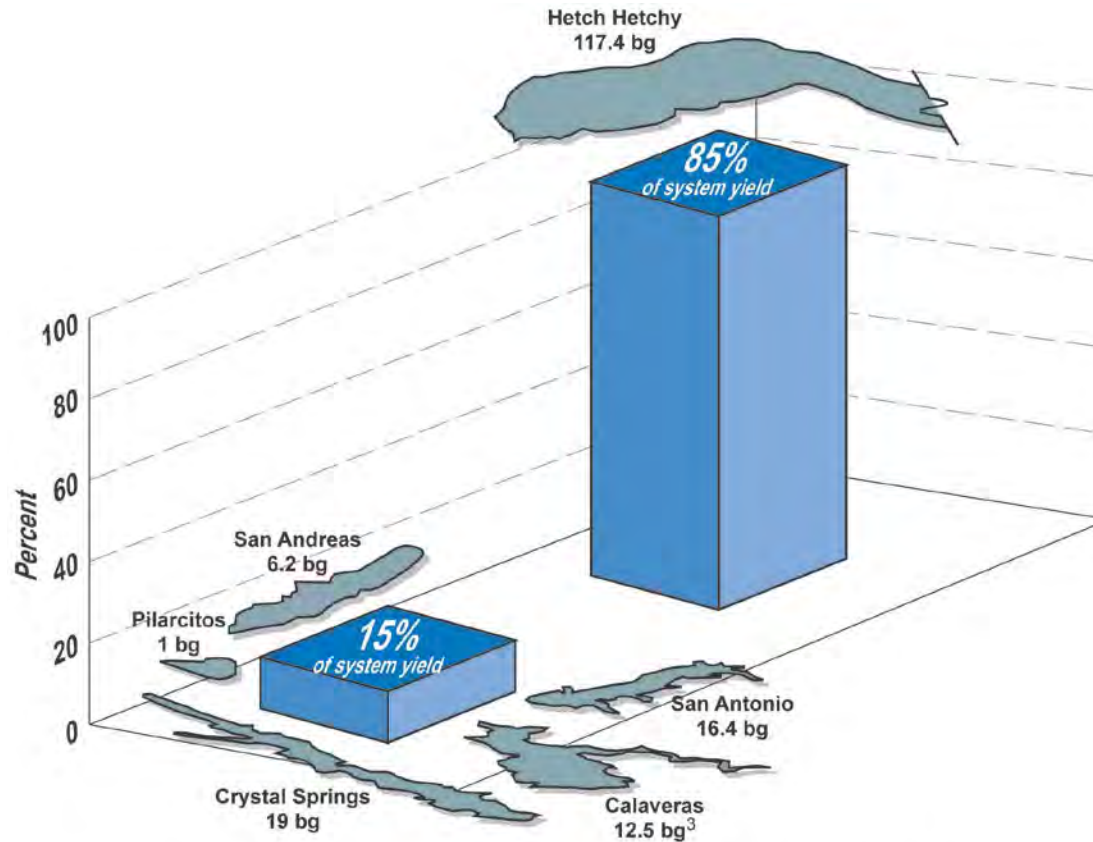
- The Regional Water System (RWS) Map
- Water sources for the RWS
- The three main systems that make up the RWS
- The Treatment Facilities from Hetchy Hetchy to the City
- The departments responsible for operating and maintaining the Regional Water System



Regional Water System Map



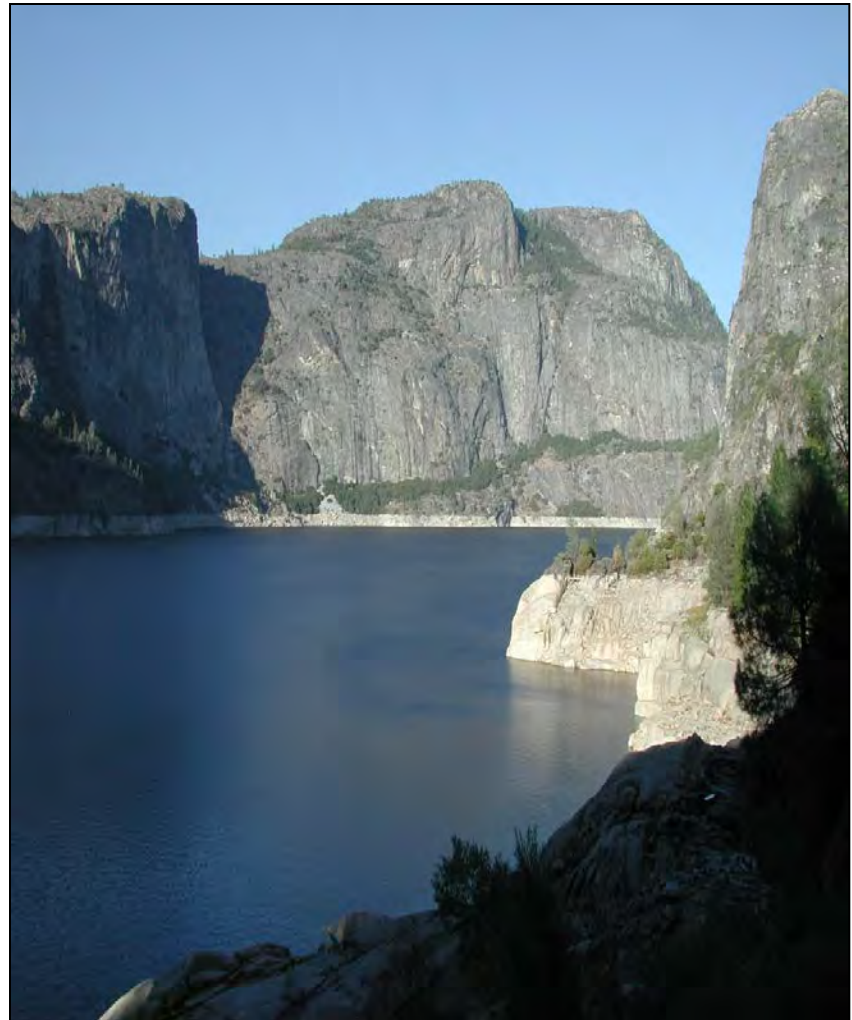
Sources of Supply



- 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



Local Sources of Supply

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



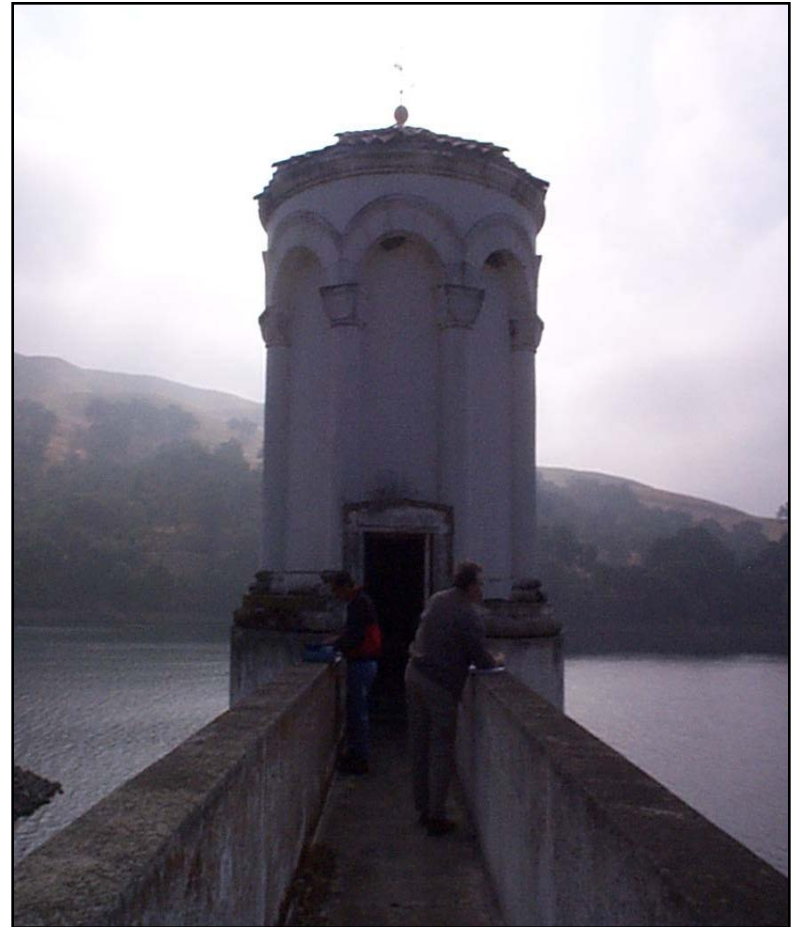
Systems & Local Watershed Sources

Systems

- Hetch Hetchy
- Alameda
- Peninsula

Local Watershed Sources

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

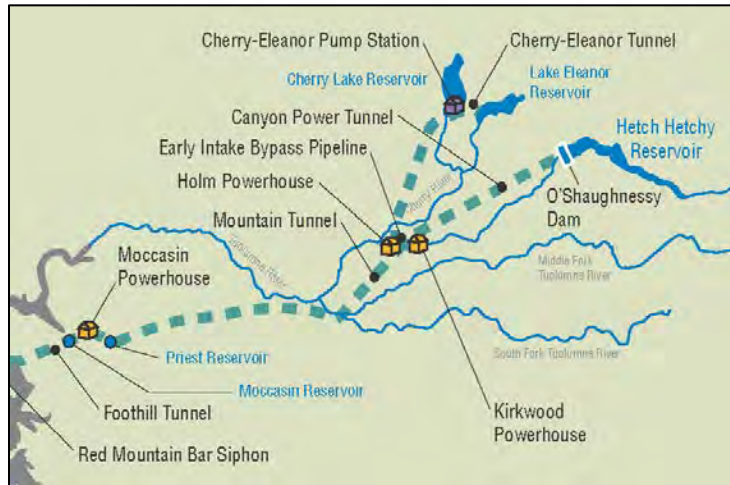


Hetch Hetchy Water and Power

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

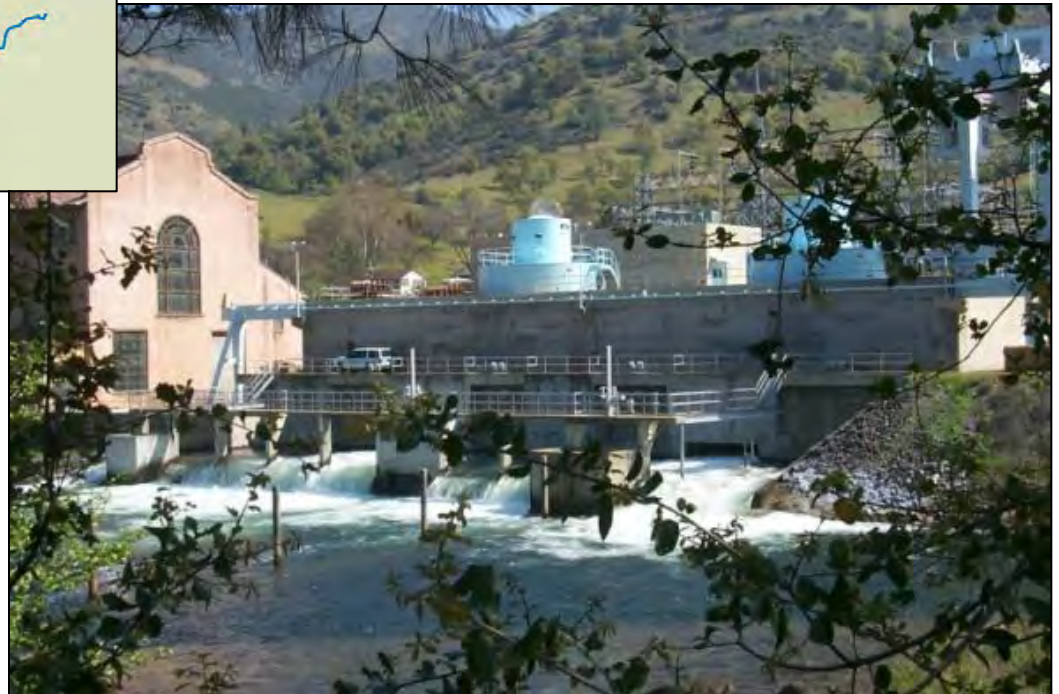


Hetch Hetchy Power

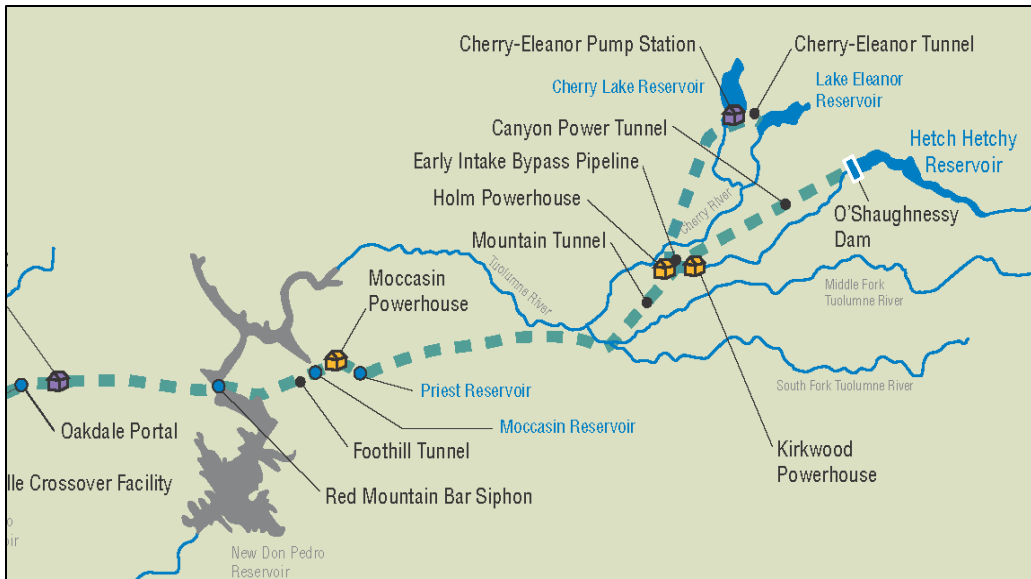


- Moccasin Powerhouse

- Holm Powerhouse
- Kirkwood Powerhouse

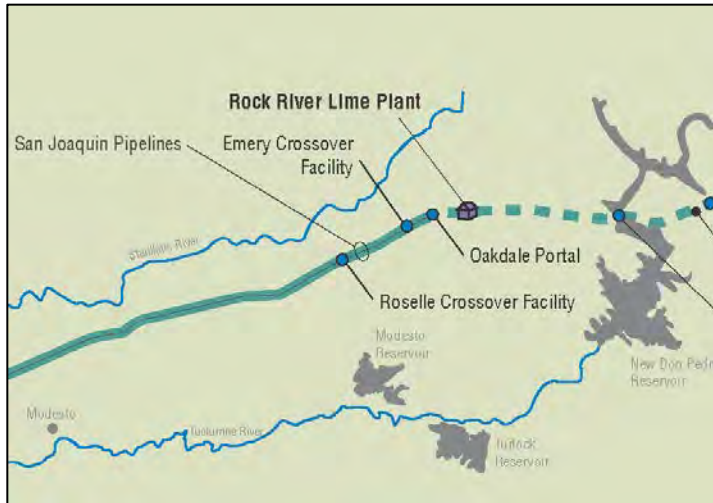


The Hetch Hetchy System



- 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

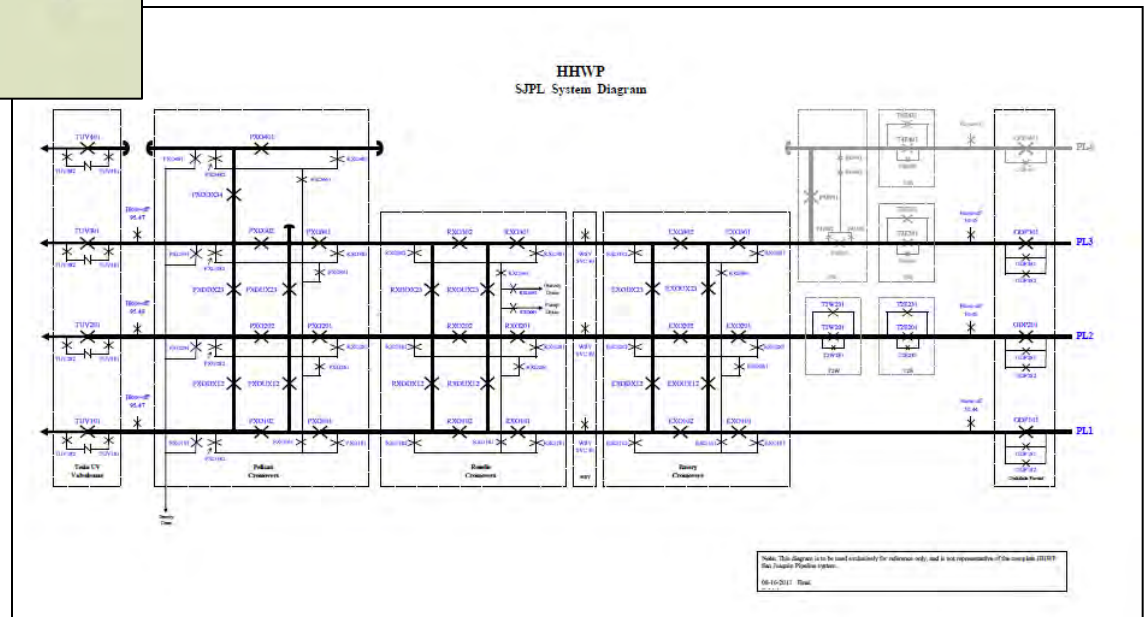


San Joaquin Pipelines



- Oakdale Portal to Tesla Portal
- Monitoring Stations

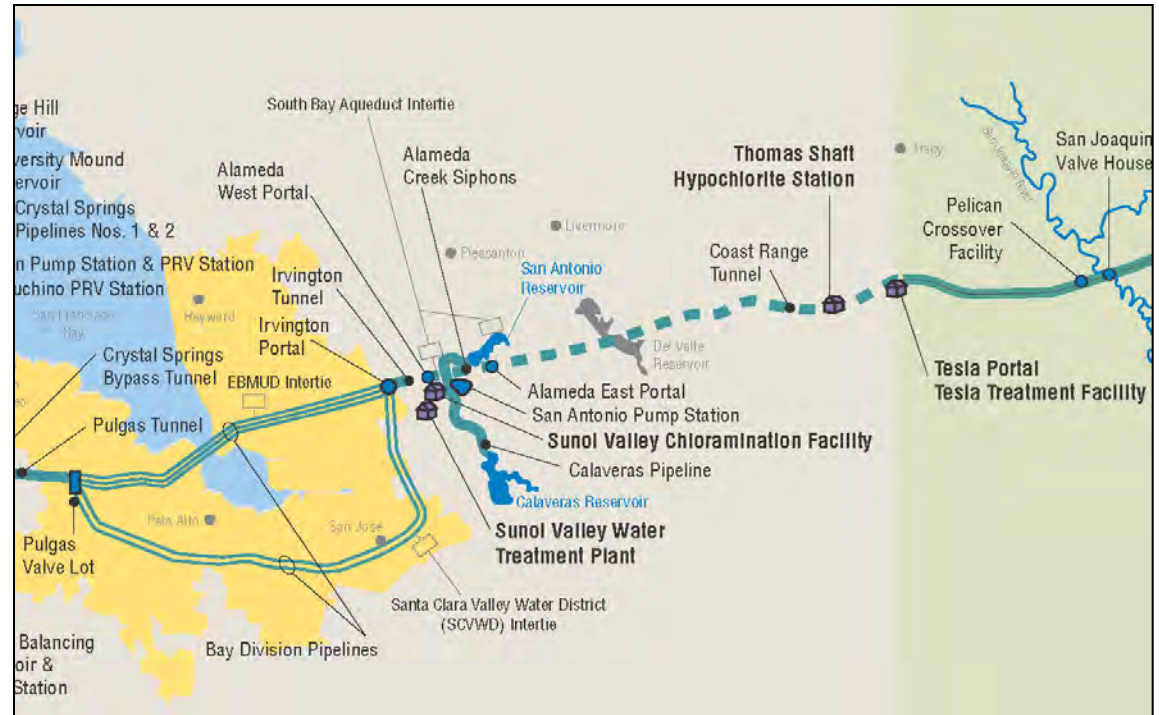
- SJPL # 4
- Crossover Facilities



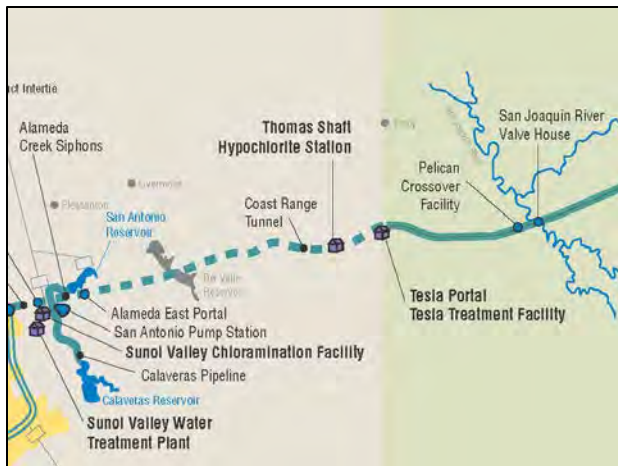
Break!

WS&T: East Bay Treatment

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



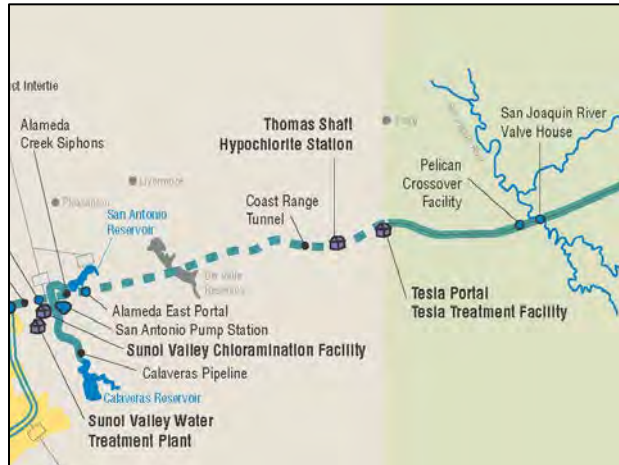
Tesla Treatment Facility



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



Thomas Shaft Chlorination Facility



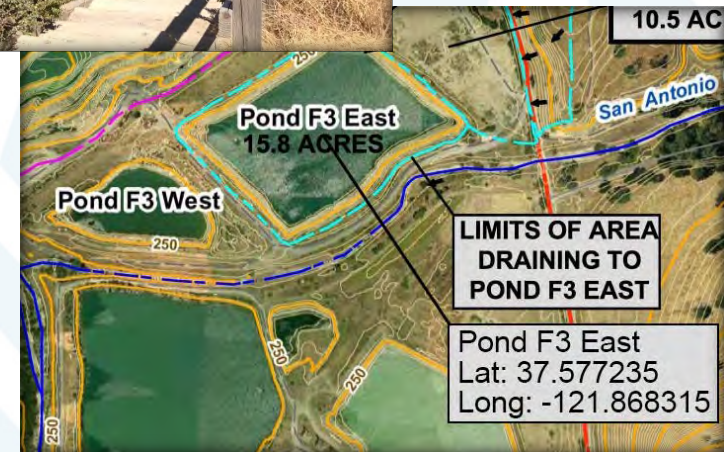
- Backup Chlorination Facility
- Treats Hetch Hetchy water



F3-East Pond

Services of the San Francisco Public Utilities Commission

- Formally a quarry pit
- Converted to a raw water source during the San Antonio Backup Pipeline project.
- Additionally used for emergency water releases and planned maintenance activities



Dechlorination station at Alameda Siphons

Services of the San Francisco Public Utilities Commission

- Dechlorination facilities at Sunol are used for neutralizing chlorine and pH for waters San Antonio Reservoir
- Meet NPDES discharge standards
- Sodium Bisulfite or Calcium Thiosulfate is used as the neutralizing agent

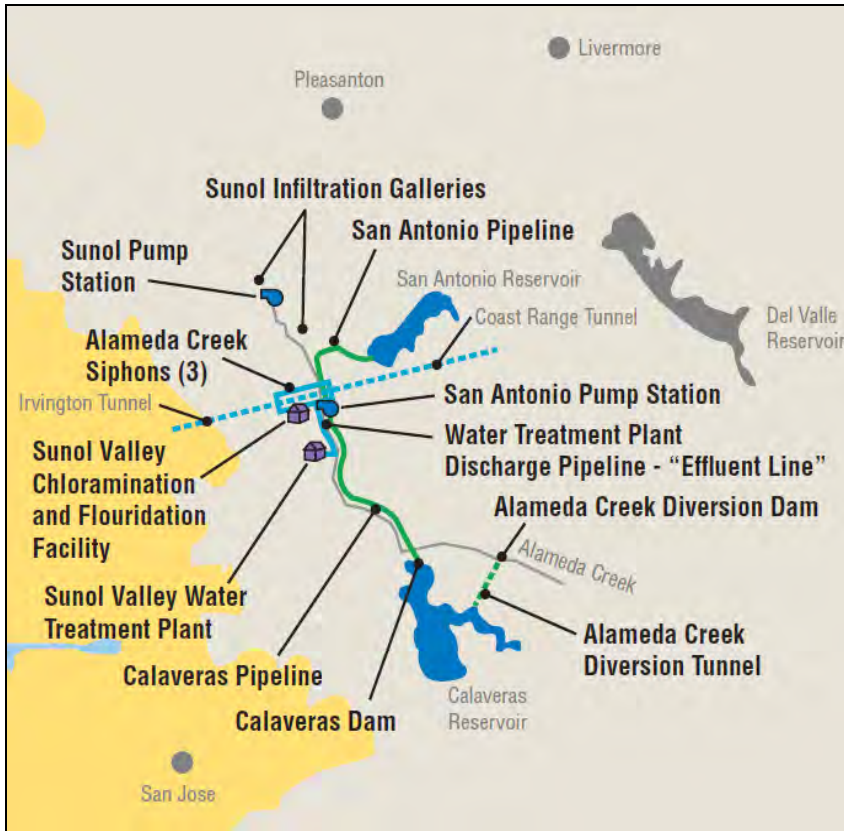


Alameda Creek Diversion Dam

- Construction to upgrade facility is underway
- Diverts water to Calaveras Reservoir and Alameda Creek
- Considerations: Steelhead Trout species, fish ladder, fish screens



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

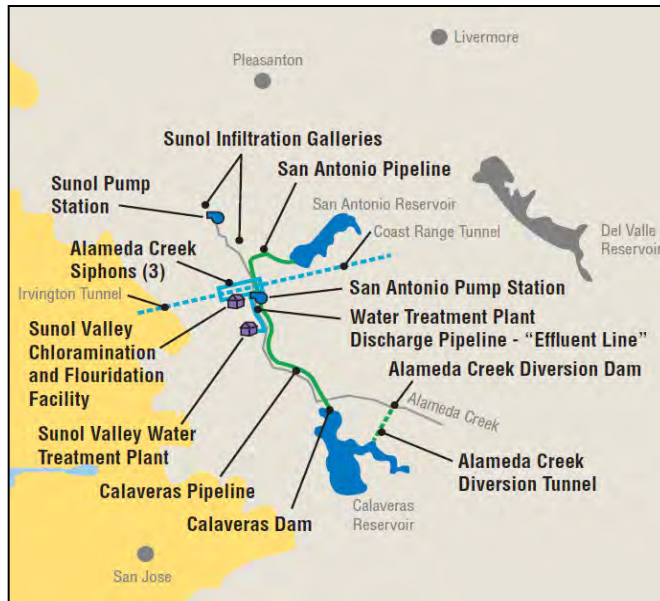


San Antonio Reservoir

- Turner Dam
- Sunol Pump Station
- South Bay Aqueduct



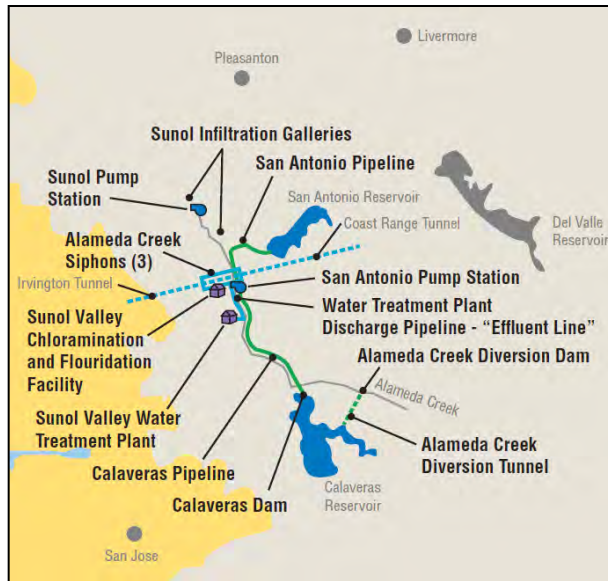
San Antonio Pump Station



- Designed to pump 90 MGD to SVWTP or San Antonio Reservoir
- Can run up to 150 MGD during emergency scenarios



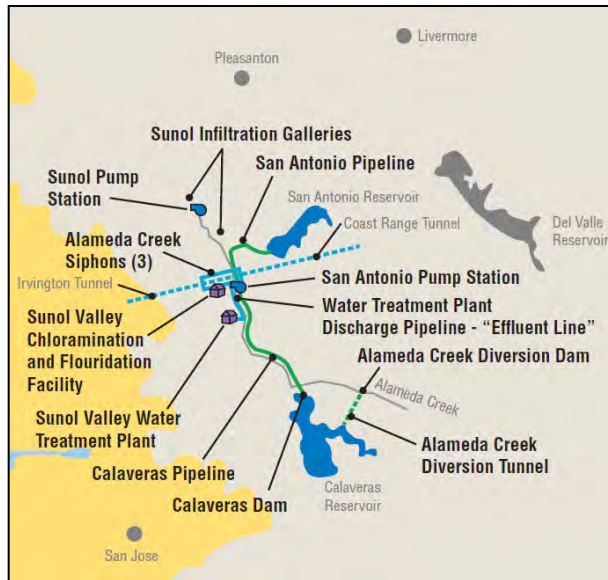
Sunol Valley Water Treatment Plant



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



Sunol Valley Chloramination Facility

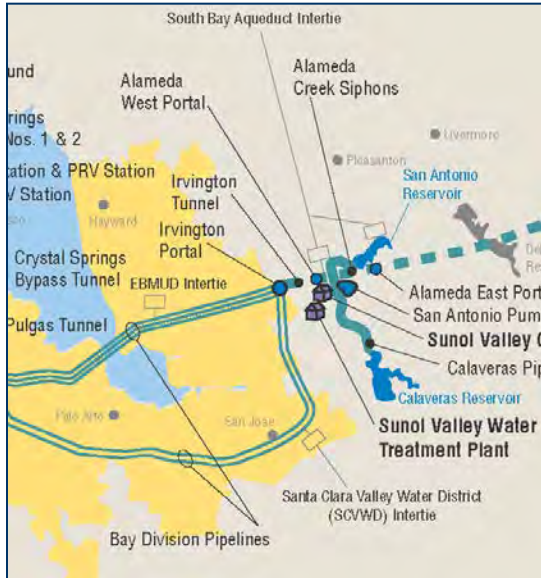


- Ammonia injection to produce Chloramines
- Alameda Siphons

- Treats water from SVWTP and Hetch Hetchy



Interconnections with Other Agencies



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

- South Bay Aqueduct



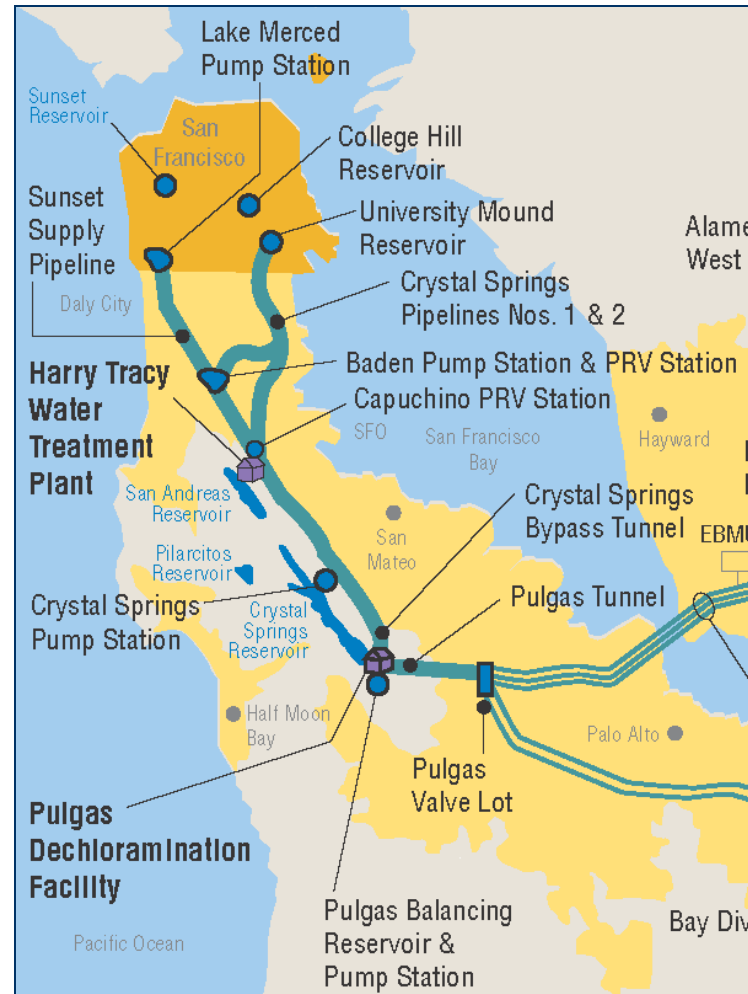
Upcoming WSIP Projects

- Alameda Creek Recapture Project
- Alameda Creek Diversion Dam and Fish Passage Facilities
- Calaveras Dam

Questions & Discussion
OR
Matching Exercise #1

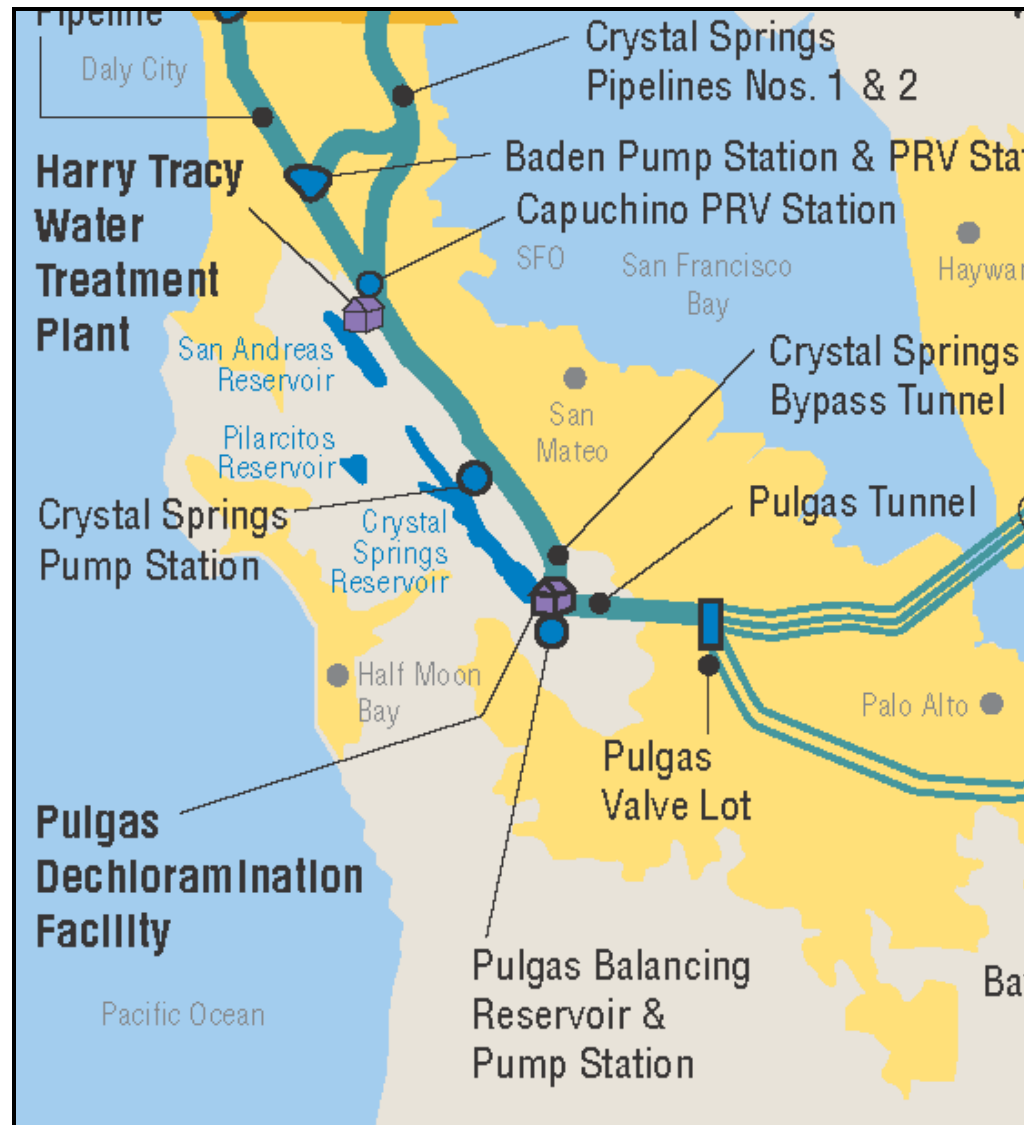
Peninsula System

- 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



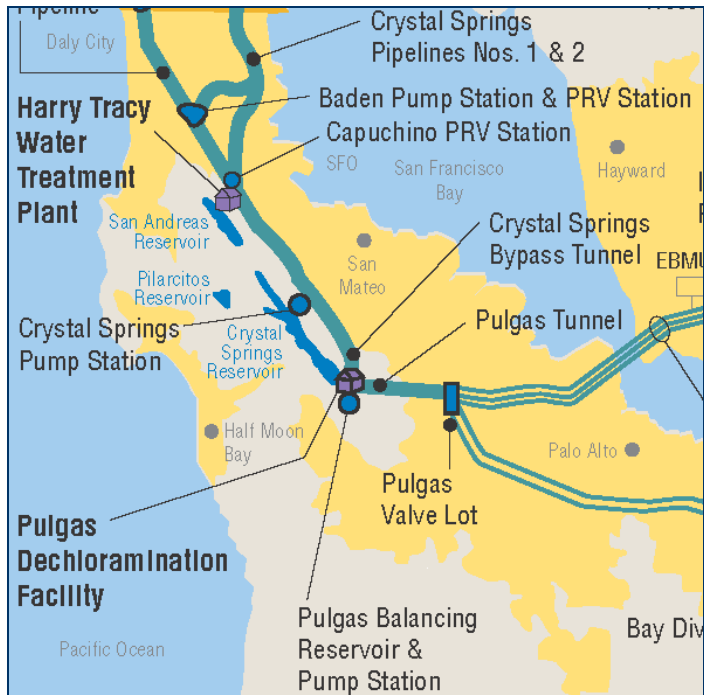
Low Gradient Pressure Zone



High Gradient Pressure Zone



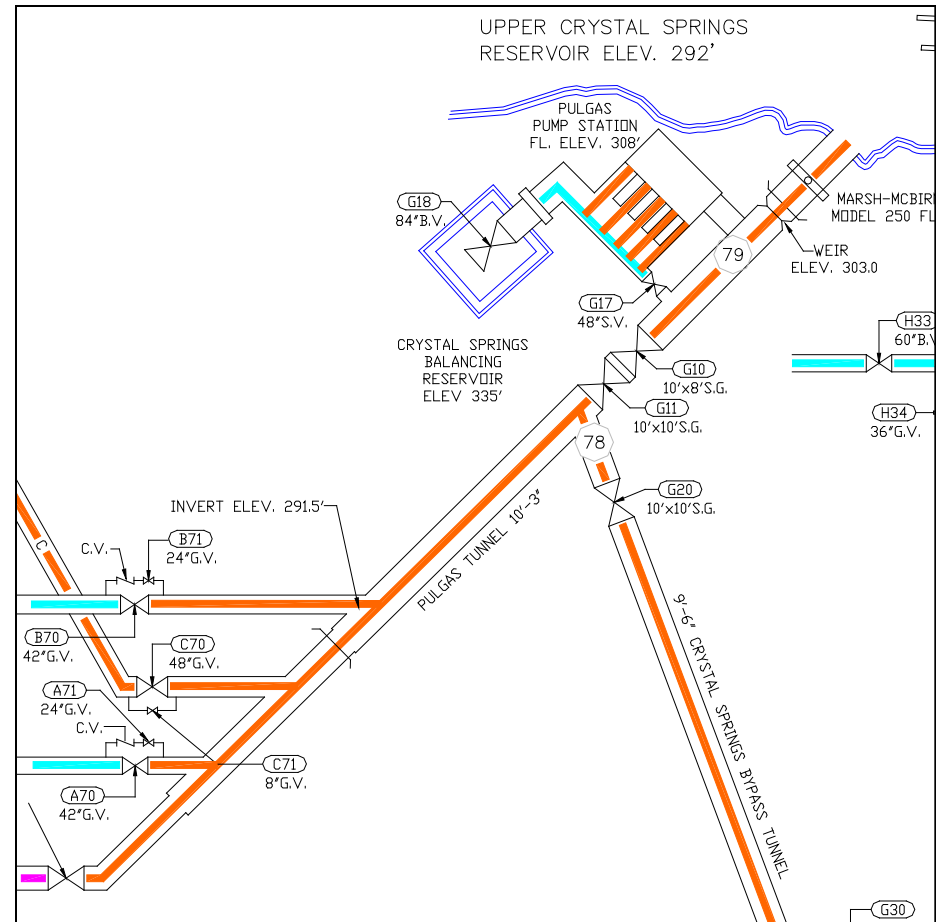
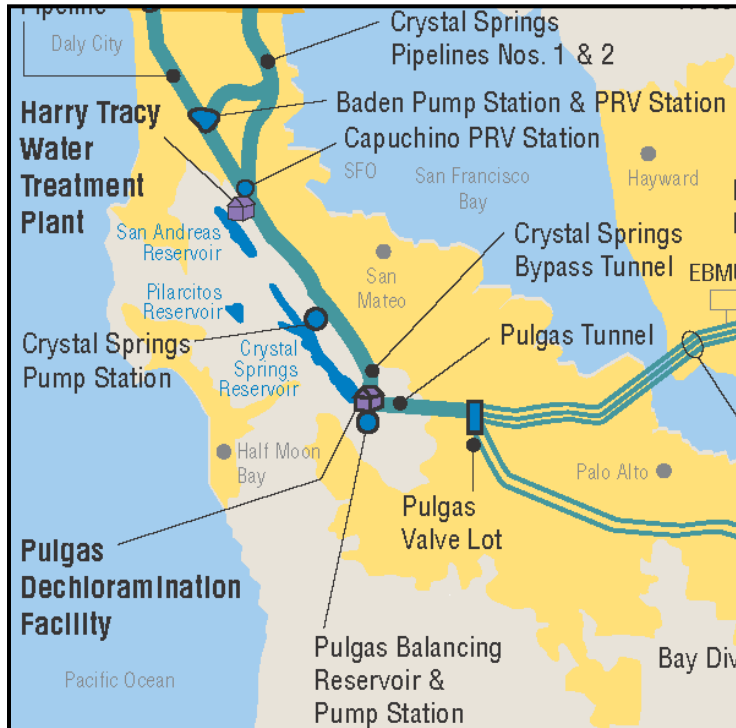
Pulgas Valve Lot



- 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



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

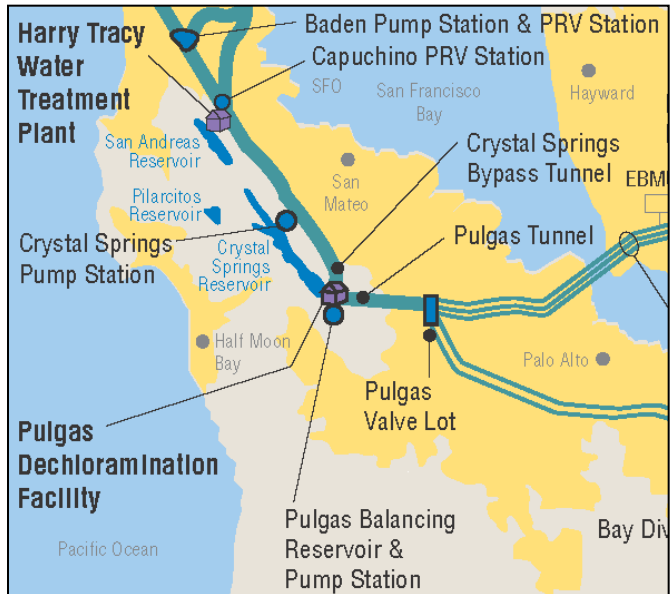


Pulgas Pump Station

- 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:

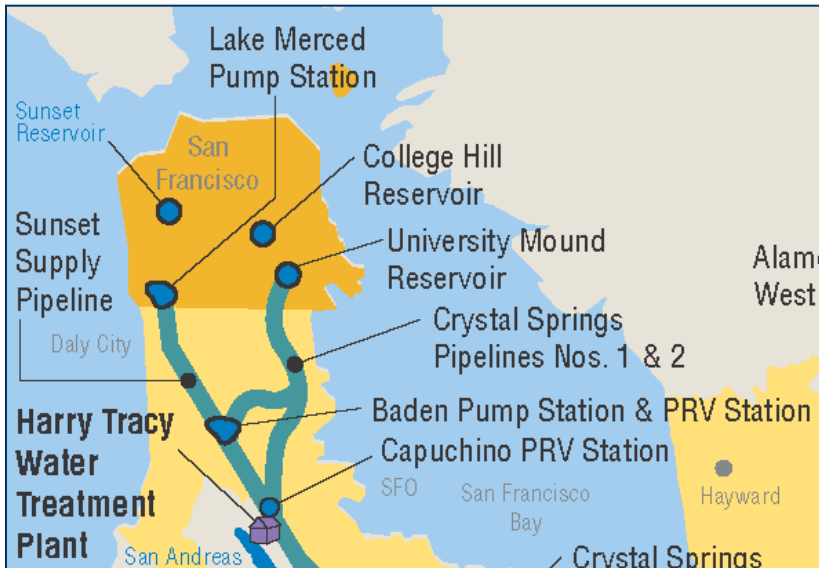
- Local Watershed
- Crystal Springs Reservoir via the Crystal Springs Pump Station



High Gradient Pressure Zone



Harry Tracy Water Treatment Plant



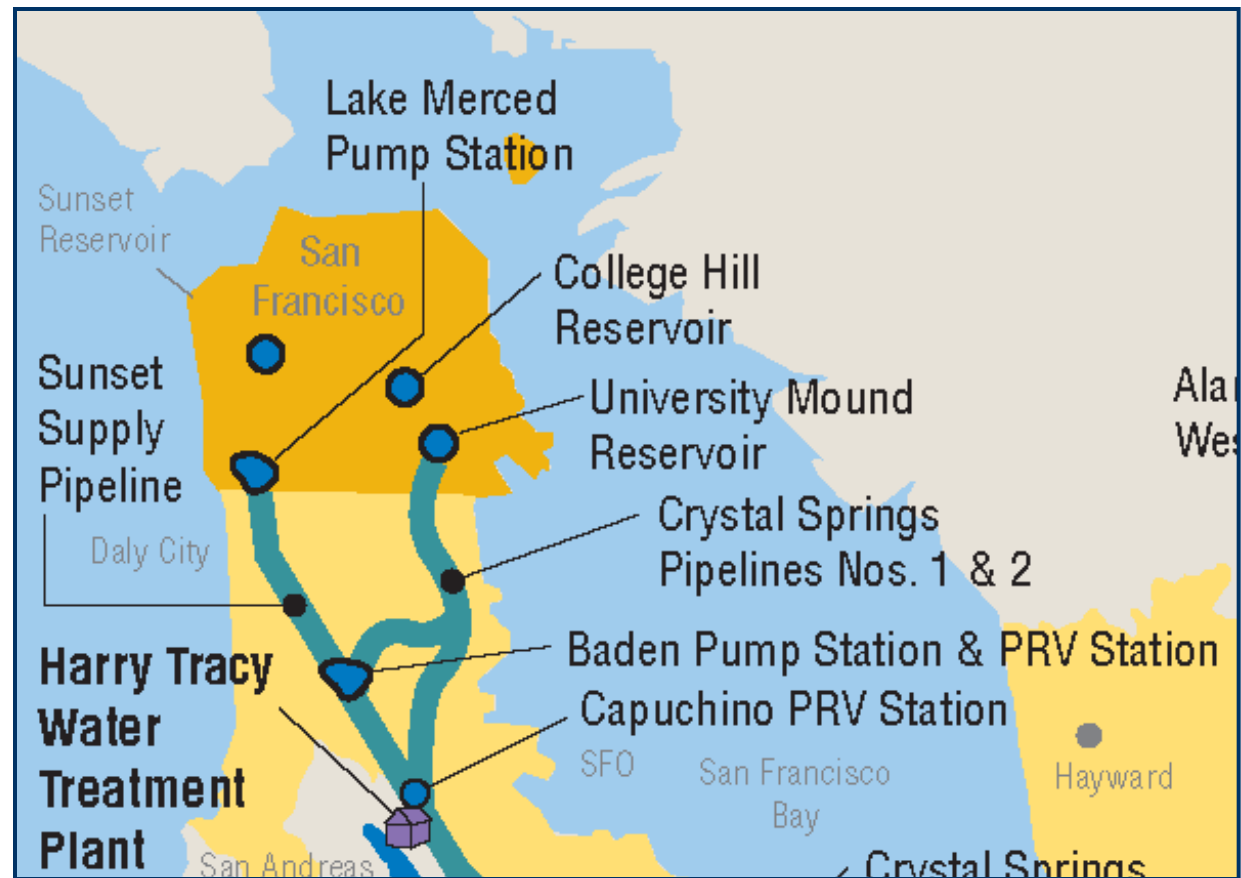
- Direct Filtration Plant capable of treating 160 MGD
- Treats water from the San Andreas Reservoir



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



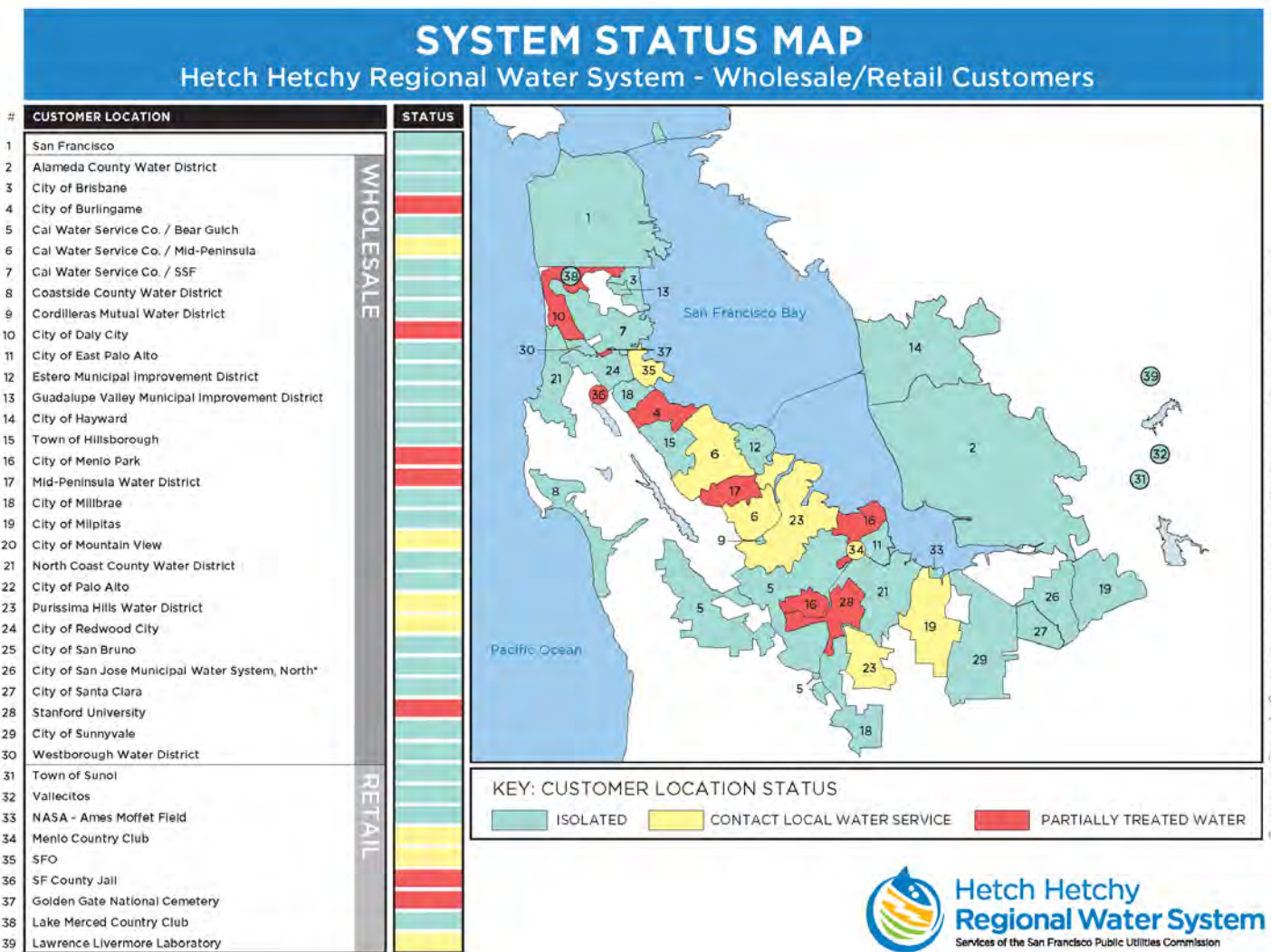
SCADA



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



*serves a portion of identified agency

City Distribution Division



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

Moving on to..

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

- Goals
- Constraints
- Strategies
- Transfers



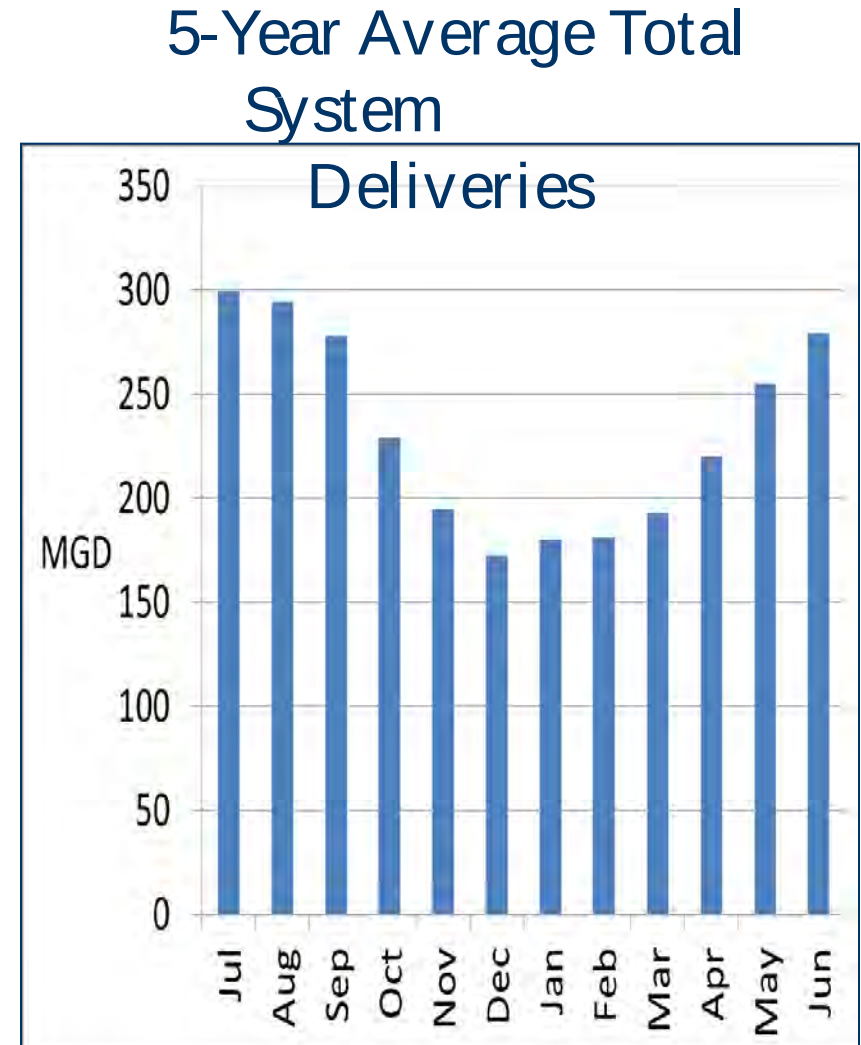
Goals

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



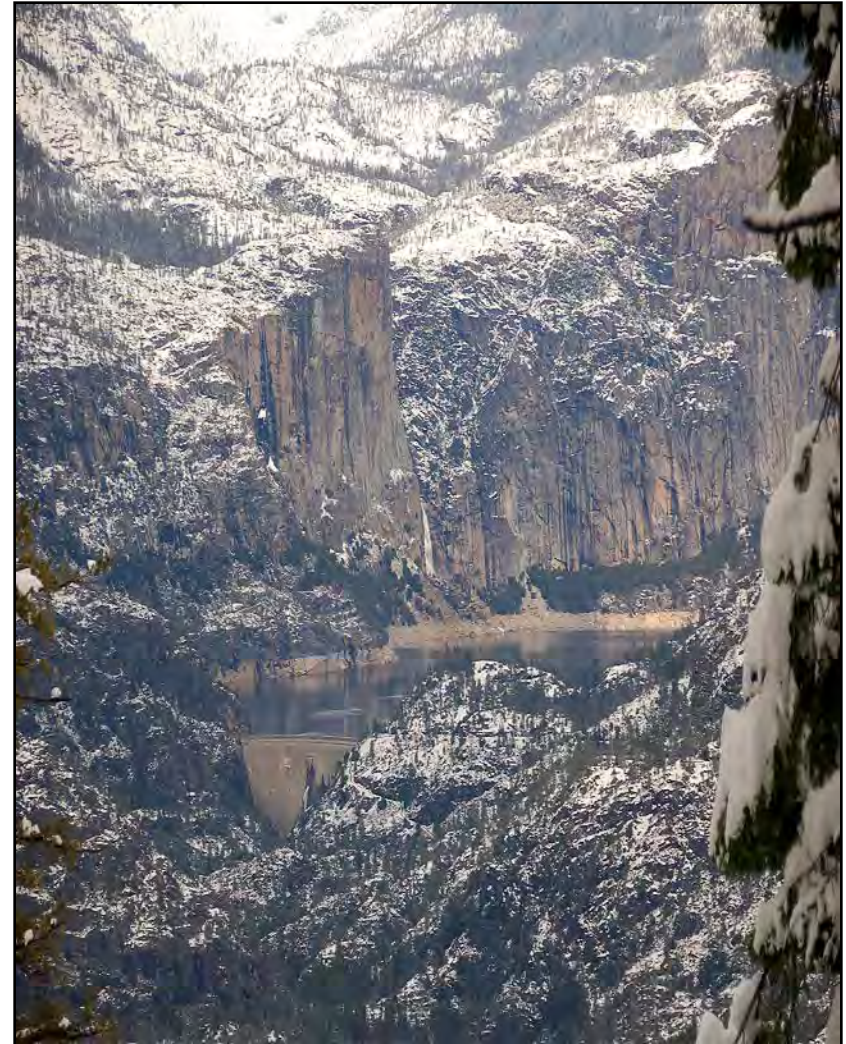
Goal #1-- Meeting Demands

- **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)

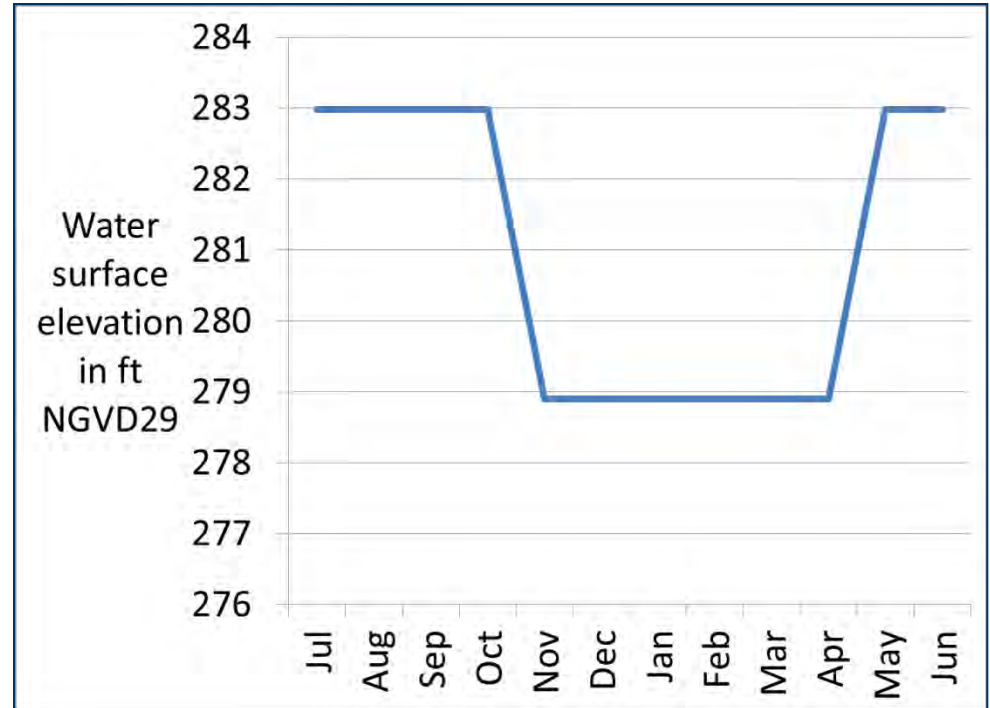
- Must meet RWS permit stipulations
- Tesla Treatment Facility, Thomas Shaft all built to support FE



Goal #3-- Local Reservoir Management

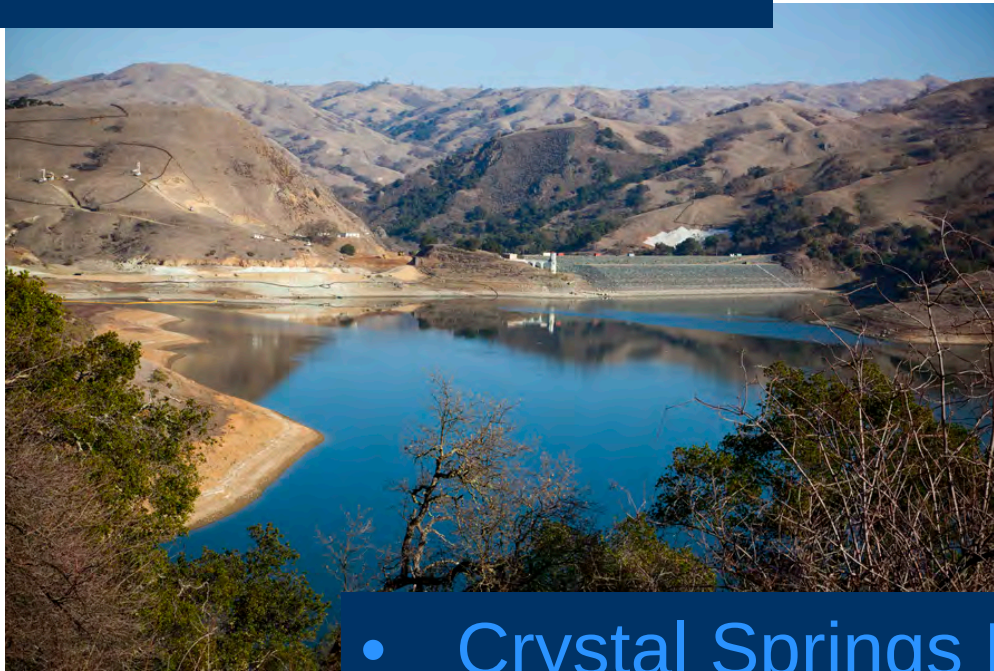
Crystal Springs Rule Curve

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



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



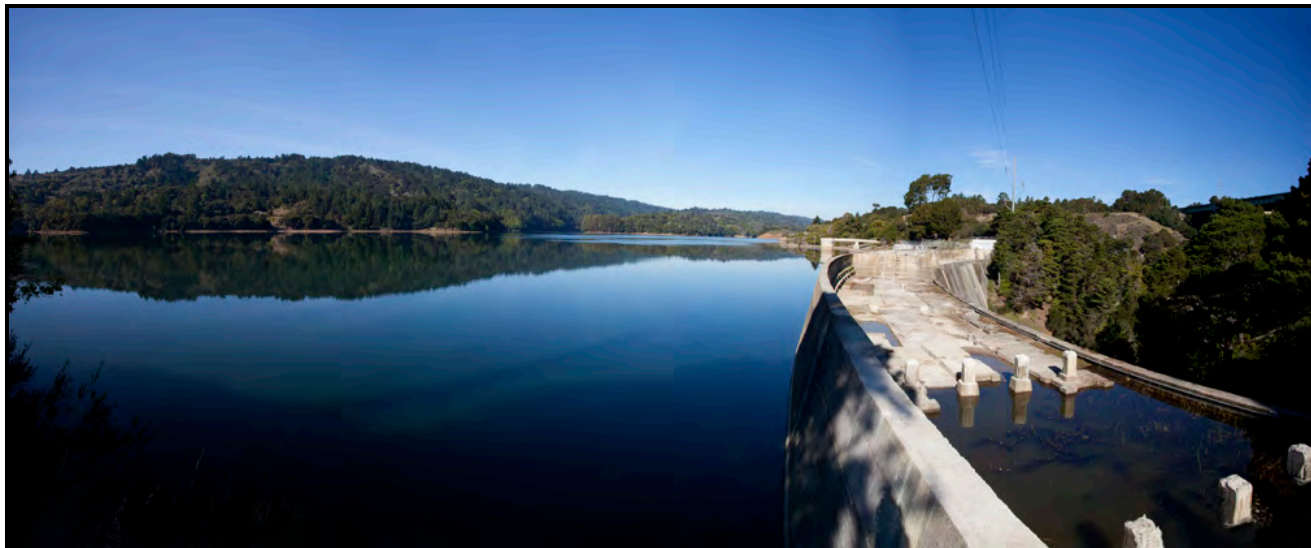
San Antonio Reservoir

- 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

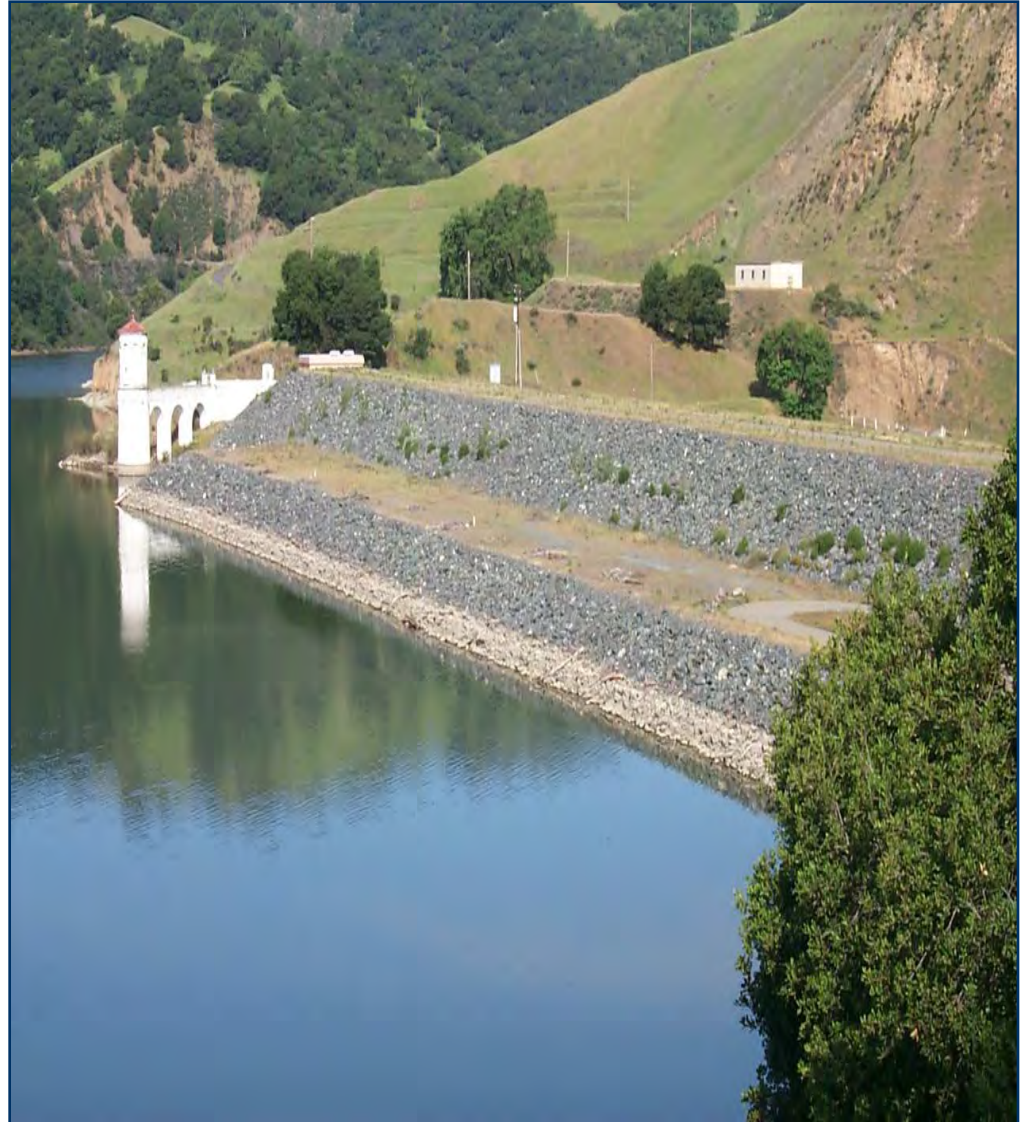
- Built 1866
- Catchment Area 3.8 sq mi
- 1BG storage
- CCWD Supply



Questions & Discussion

System Constraints

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



Operating Strategies

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



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



Post-Test

Summary

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

