Regional Water System Training
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

Chris Nelson

- System Operations
  Paul Gambon

- Maintenance Engineering
  Jon Chow

- Operations & Maintenance
  Ed Forner

- Accounting & Purchasing
  Tita Radetich

- Administration
  Lee Okumoto
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
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

- 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

- 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 Damn

- 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 Damn and Fish Passage Facilities

• Calaveras Damn
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

Legend

- Peninsula System and 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.
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

5-Year Average Total System Deliveries
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