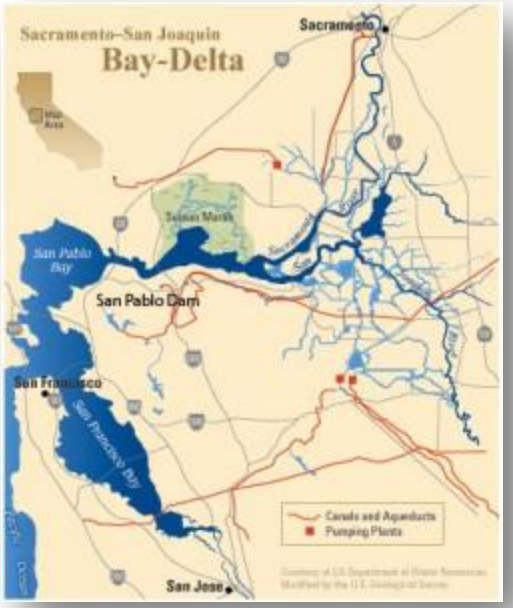
Salinity Management and Water Supply in Ventura County

Problems Facing the Calleguas Creek Watershed

- Salts in rivers, soils, and groundwater basins are increasing due to applied imported water and agriculture.
- Essentially, more salt comes into the watershed than goes out, building up salts over time.

Problems Facing the Calleguas Creek Watershed

- Water Supply:
  - Although there is plenty of salty groundwater in some parts of the County, there is no place to discharge concentrate from groundwater desalters.
  - Imported water supplies are becoming increasingly more expensive and less reliable.



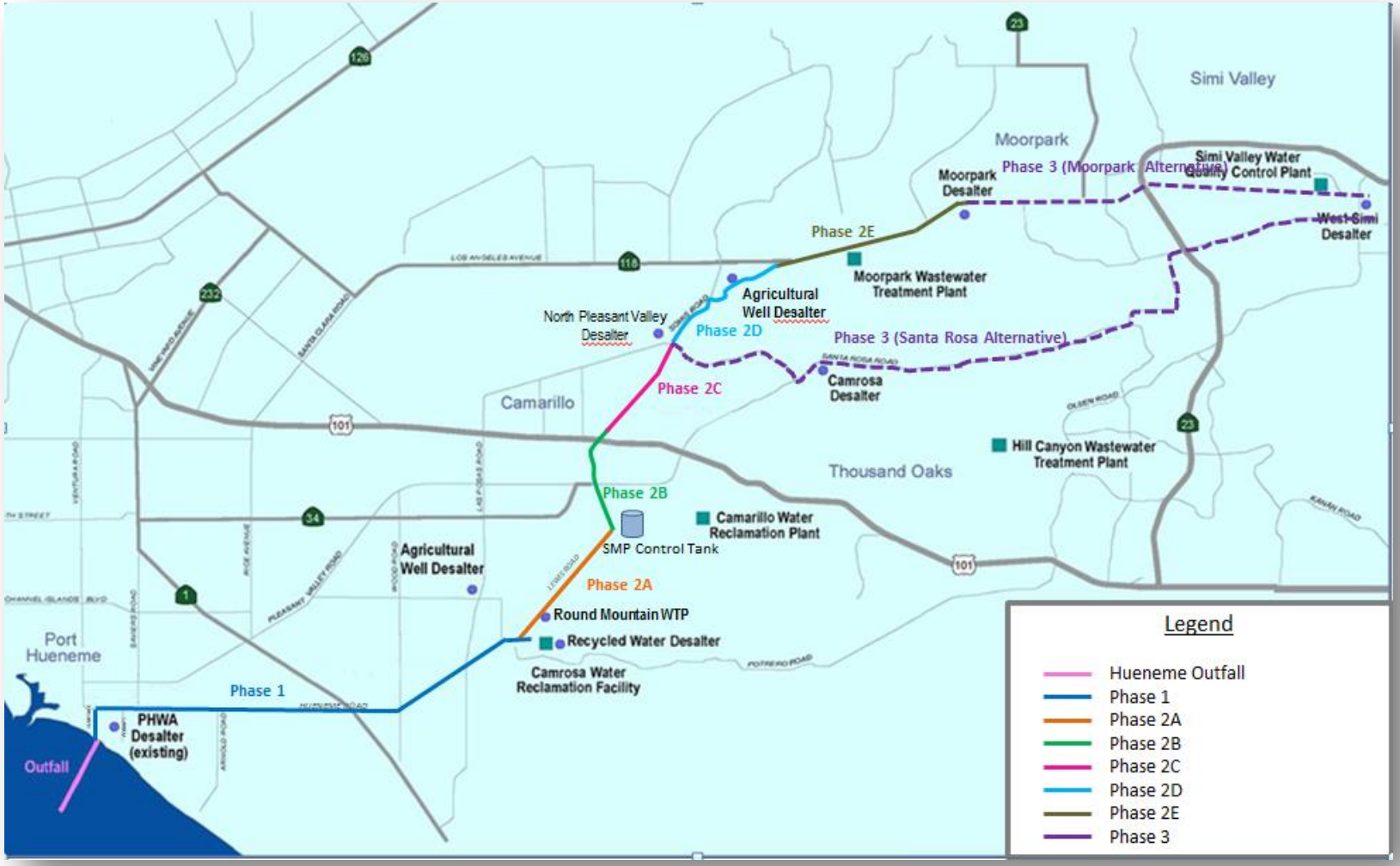
Problems Facing the Calleguas Creek Watershed

- Water Quality:
  - Regulations limit discharge of salt to local creeks and wastewater plants cannot meet the requirements.
  - Regulatory requirements called Total Maximum Daily Loads (TMDL) require that the salts issues be addressed.

Problems Facing the Calleguas Creek Watershed

- The Salinity Management Pipeline is the solution:
  - **Increase water reliability** by allowing saline groundwater to be used for municipal and expanded agricultural purposes.
  - **Reduce salinity** of local surface water and groundwater by removing salt from the watershed.

Salinity Management Pipeline



Anticipated Dischargers

- Municipal and Industrial Groundwater Desalters
- Agricultural Groundwater Desalters
- Wastewater Treatment Plants

Municipal and Industrial Groundwater Desalters

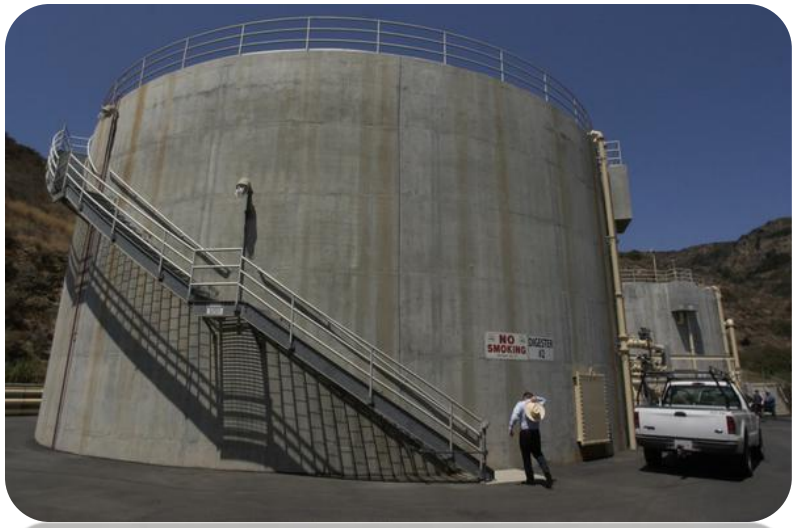
- Groundwater desalters are cost effective for anyone buying imported water.
- At about $1,000/AF, the cost is equal to buying imported water.
- The price will increase more slowly than the price of imported water.
- Extracting salty water from the groundwater basin makes room for recharge with higher quality stormwater flows.

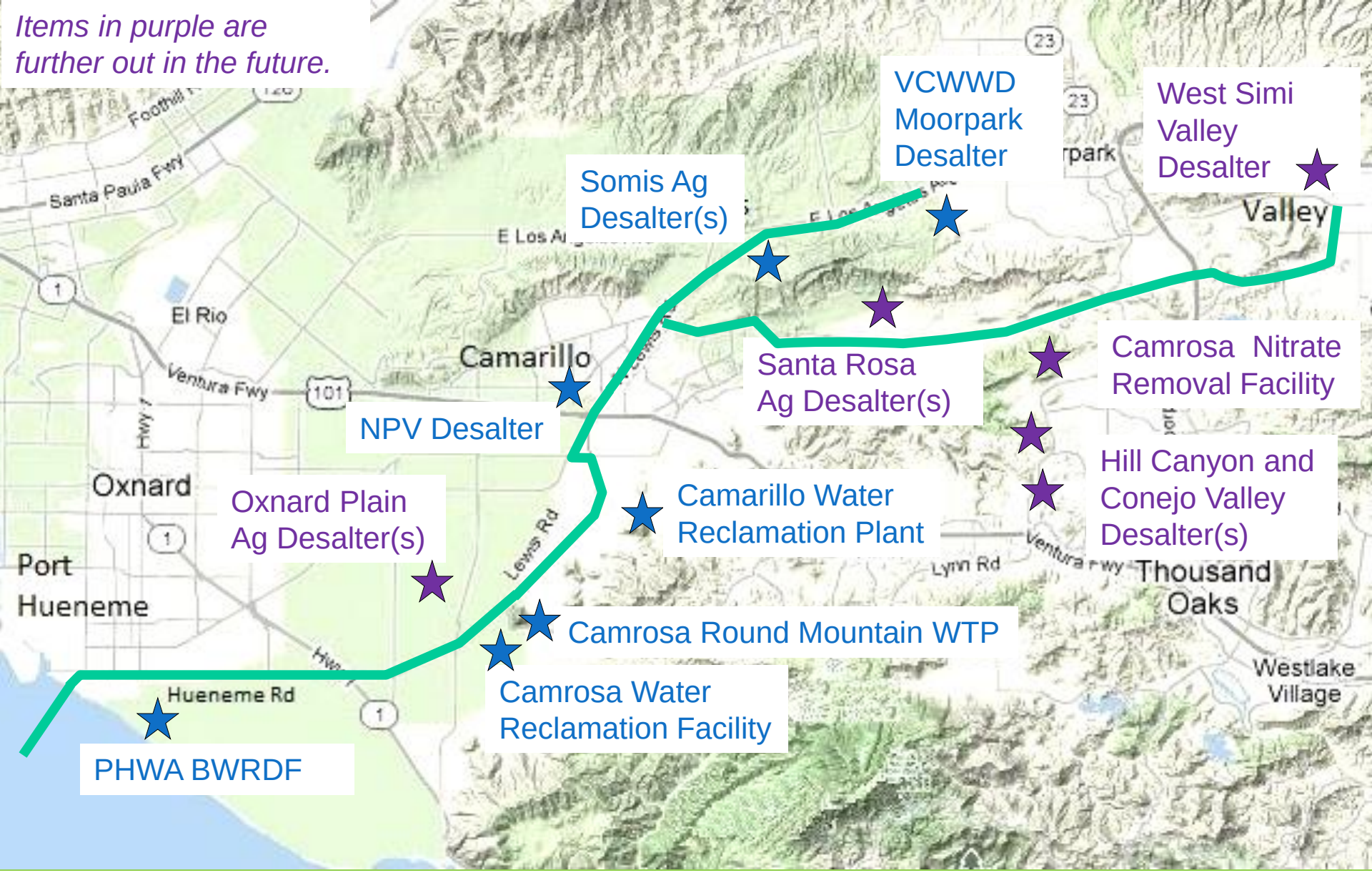
Agricultural Groundwater Desalters

- Groundwater desalters appear to even be cost effective for agriculture.
- Treatment cost is less because they are primarily interested in chloride reduction.
- With lower chlorides, they
  - can use less water
  - achieve higher crop yields
  - grow better quality produce

Wastewater Treatment Plants

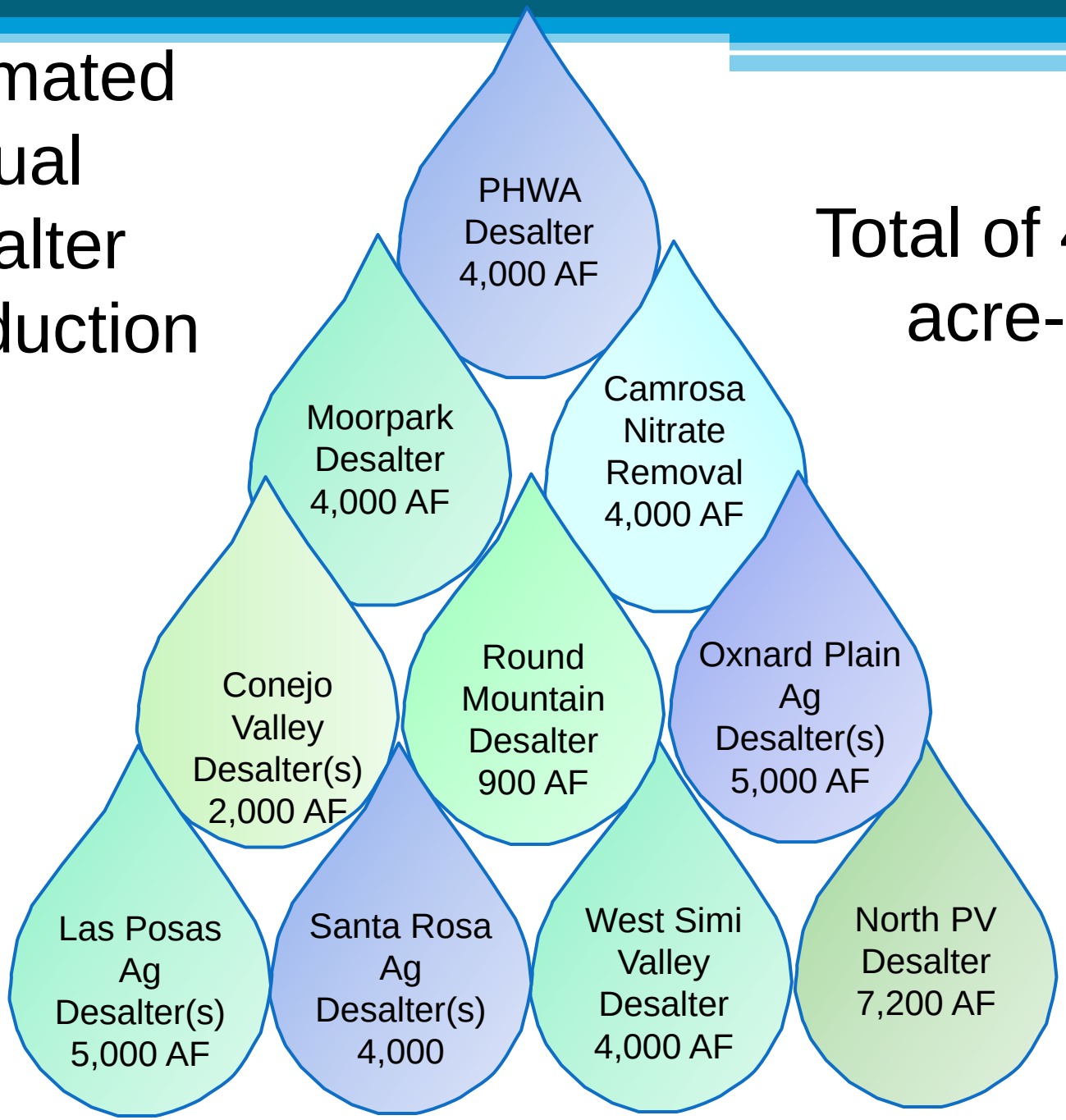
- Wastewater plants need a place to discharge their excess recycled water during the wet winter months.
- They cannot discharge to the creek due to salts limitations.
- Additionally, some may wish to desalt their recycled water and produce an ultra-pure product for non-potable uses.





Anticipated Dischargers

Estimated Annual Desalter Production



Total of 40,000 acre-feet

Water Quality Considerations

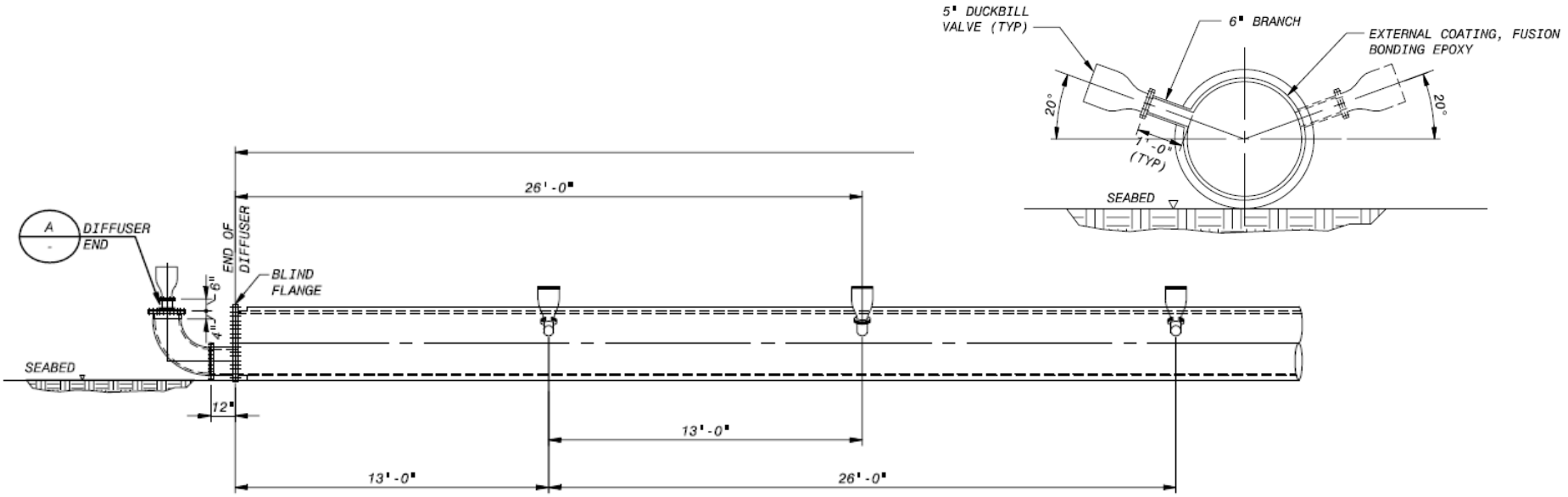
- Discharge through the SMP outfall is regulated by an individual NPDES permit from the RWQCB.
- Requirements are based on standards in the California Ocean Plan to protect all beneficial uses, including:
  - Industrial water supply
  - Water contact and non-contact recreation, including aesthetic enjoyment
  - Commercial and sport fishing
  - Navigation
  - Mariculture
  - Preservation and enhancement of ASBS
  - Rare and endangered species
  - Marine habitat
  - Fish migration
  - Fish spawning
  - Shellfish harvesting

Water Quality Considerations

- As part of the permitting process, outfalls are granted a “dilution ratio” which quantifies the level of mixing between the discharge and the ambient water.
- The dilution ratio is determined through various computer modeling programs developed for this purpose.
- Design elements that promote mixing include multiple outlets, diffusers, and depth of discharge.
- Discharge from the SMP is much less saline and therefore less dense than seawater.

Water Quality Considerations

- Hueneme Outfall has 5” duckbill valve ports staggered at 26’ spacing.
- Increases mixing of discharge with ambient water.



Water Quality Considerations

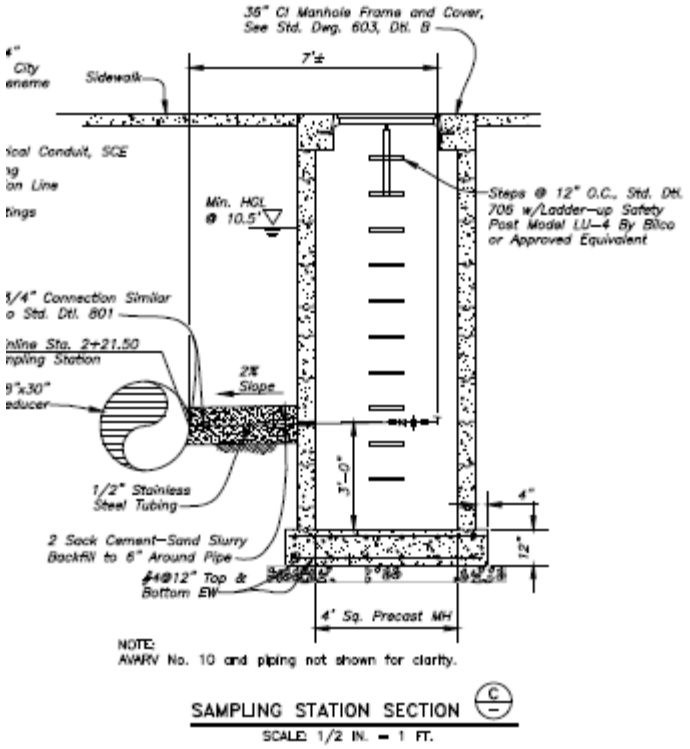
- Hueneme Outfall was granted a 72:1 dilution ratio (although several models demonstrated much higher values).
- 72:1 dilution is more than sufficient for compliance with Ocean Plan standards and anticipated water quality, which is largely driven by the copper standard.

Water Quality Considerations

- Dischargers are not allowed to discharge any surface water, irrigation runoff, or stormwater runoff.
- Individual discharges are required to comply with all water quality requirements.
- Compliance must be achieved for the discharger's discharge only, without mixing with other SMP flows.

Water Quality Considerations

- Required to monitor at sampling station near outfall.
- Will also sample concurrently at each discharger's discharge station for all of the same constituents.
- This will help us determine who is responsible if there is an exceedance at the sampling station.
- Extensive monitoring of receiving water quality is also required.



Water Quality Considerations

Constituents to be Analyzed to Achieve Ocean Plan Compliance

General Constituents
Ammonia as Nitrogen
Ammonia (w/ Nitrification)
Boron
BOD
COD
Chloride
Chlorine Residual
Oil & Grease
Settleable Solids
Sodium
Sulfate
TDS
TSS
Turbidity
pH

Pesticides
Aldrin
Chlordane
DDT
Dieldrin
Endosulfan
Endrin
Heptachlor
Heptachlor epoxide
Hexachlorocyclohexane
Polychlorinated biphenyls
Toxaphene

Miscellaneous Compounds
Chlorinated Phenolics
Halomethanes
PAHs
Phenolic Compounds
TCDD equivalents
Tributyltin

Bacterial Characteristics
Total Coliform
Fecal Coliform

Metals
Antimony
Arsenic
Beryllium
Cadmium
Chromium (III)
Chromium (VI)
Copper
Cyanide
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

Volatile Organic Compounds
1,1,1-trichloroethane
1,1,2,2-tetrachloroethane
1,1,2-trichloroethane
1,1-dichloroethylene
1,2-dichloroethane
1,3-dichloropropene
1,4-dichlorobenzene
Acrolein
Acrylonitrile
Benzene
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroform
Dichloromethane (Methylene Chloride)
Dichlorobromomethane
Ethylbenzene
Tetrachloroethylene
Toluene
Trichloroethylene (TCE)
Vinyl Chloride

Toxicity
Acute
Chronic

Semi-Volatile Organic Compounds
1,2-diphenylhydrazine
2,4,6-trichlorophenol
2,4-dinitrophenol
2,4-dinitrotoluene
3,3-dichlorobenzidine
4,6-dinitro-2-methylphenol
Benzidine
Bis(2-chloroethoxy) methane
Bis(2-chloroethyl) ether
Bis(2-chloroisopropyl) ether
Bis(2-ethylhexyl) phthalate
Dichlorobenzenes
Diethyl phthalate
Dimethyl phthalate
Di-n-butyl phthalate
Fluoranthene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Isophorone
Nitrobenzene
N-nitrosodimethylamine
N-nitrosodi-N-propylamine
N-nitrosodiphenylamine


Questions?