Design Criteria

Plant Flow
- Maximum In-Plant Flow: 44 mgd
- Maximum Plant Production: 40 mgd

Carbon Dioxide
- Number of Storage Tanks: 1
- Total Storage Capacity: 50 Tons
- Design Dose: 3 - 40 mg/L

Liquid Oxygen
- Number of Storage Tanks: 2
- Capacity of Each Storage Tank: 9,000 gallons
- Total Storage Capacity: 18,000 gallons
- Number of Ambient Vaporizers: 3

Ozone Generators
- Number of Ozone Generators: 3 (2 duty, 1 standby)
- Capacity of Each Ozone Generator: 750 lbs/day
- Total Firm Ozone Generation Capacity: 1,500 lbs/day
- Total Ozone Generation Capacity: 2,250 lbs/day
- Design Dose: 1 - 4 mg/L

Ozone Contactor Structure
- Type: Over/Under Baffle, Fine Bubble Diffusion
- Number of Contactor Basins: 2
- Volume of Each Contactor Basin: 126,400 gallons
- Total Volume of Contactor Basins: 252,800 gallons
- Theoretical Detention Time at Max Flow: 8 minutes

Filter Media
- Arctarite
  - Depth: 44 - 48 inches
  - Effective Size: 1.2 - 1.3 mm
  - Uniformity Coefficient: <14
- Silica Sand
  - Depth: 8 - 12 inches
  - Effective Size: 0.6 - 0.7 mm
  - Uniformity Coefficient: <14

Filter Backwashing
- Maximum Backwash Water Flowrate: 25 gpm/sf
- Air Scour Rate: 4 scfm/sf

Chlorine Contact Pipeline
- Length: 580 ft
- Diameter: 72 inches
- Design Chlorine Residual: 2.9 mg/L
- Contact Time at Max Flow: 4 minutes

Utility Water Pump Station
- Number of Utility Water Pumps: 3 (2 duty, 1 standby)
- Capacity of Each Utility Water Pump: 900 gpm
- Total Firm Capacity of Utility Water Pumps: 1,800 gpm
- Number of Jockey Pumps: 2 (1 duty, 1 standby)
- Capacity of Each Jockey Pump: 100 gpm

Zone 7 Water Agency

About Us
Zone 7 Water Agency supplies treated drinking water to retailers serving nearly 240,000 people in Pleasanton, Livermore, Dublin, and through special agreement with Dublin San Ramon Services District, to the Dougherty Valley area of San Ramon. In a typi- cal year, approximately 80 percent of the agency’s water supply originates in the Sierra and is imported through the Delta, with the rest pumped from the groundwater basin or coming from rain runoff in our Lake Del Valle watershed. Zone 7 also supplies irri- gation water primarily to agricultural customers, manages the groundwater basin, and provides flood protection to all of east- ern Alameda County. The Agency operates two surface water treatment plants, ten municipal supply wells, and a groundwater demineralization plant.

Acknowledgements
Zone 7 Water Agency Board of Directors
- John Greci, President
- Jim McInally, Vice President
- Dick Quigley
- Sandy Figueres
- Sarah Palmer
- Angela Ramirez Holmes
- Bill Stevens

Designed by: CDM Smith
Prime Contractor: C. Overaa & Co.
Construction Manager: Covello Group

Project Facts

Major Improvements:
- New ozonation facilities, including liquid oxygen storage and vapor- ization, ozone generation, ozone contactor, and ozone offgas destruct
- Conversion of traditional filters to biological filters with water/air backwash
- New carbon dioxide system for pH adjustment prior to ozonation
- Modifications to existing chemical systems
- New Chlorine Contact Pipeline to provide post-filtration and back- up disinfection during ozone system outage
- Plant overflow and flow splitting modifications
- New water softening system for chemical systems
- New utility water pump station to replace existing plant water pumps and supply cooling water to ozone equipment
- Modifications to plant electrical system to accommodate new loads and provide reliable power supply to the entire plant
- New electrical facilities to purchase power from the Power and Water Resources Pooling Authority (PWSPA)
- New emergency generator /back up power generator

Project Costs:
- Planning and design: $3.5 million
- Construction and construction management: approximately $45 million

Schedule:
- Anticipated to be completed and online by March 2020
Project History

The Del Valle Water Treatment Plant (DVWTP) was constructed in 1975 with a capacity of 34 million gallons per day (mgd) and subsequently expanded to 40 mgd. The plant’s existing major treatment process consists of clarification using Superpulsators, dual-media filtration using anthracite and sand, and disinfection using chlorine. The major source of raw water supply for the DVWTP is surface water imported through the Sacramento-San Joaquin River Delta and conveyed via the South Bay Aqueduct, along with local runoff from Del Valle Reservoir. In recent years, treating this water supply with currently installed treatment processes at the DVWTP has become increasingly difficult due to more frequent algae blooms that can cause taste and odor problems, blue-green algae blooms that can produce algal toxins, high levels of organic matter, diurnal formation of bromate, a byproduct of ozonation, and enhance the performance of downstream treatment processes.

Ozonation

Ozone Generation: The Ozone Generation Building houses three ozone generators, each with its own power supply unit (PSU), as well as cooling water pumps and heat exchanger, electrical, and other ancillary equipment. Ozone generators are stainless steel vessels containing horizontal dielectric tubes that generate an ozone-in-water residual. The PSU consists of transformers and other equipment that convert plant electrical power to the voltage and frequency used by the ozone generator, and conditions the power to ensure a stable and reliable power supply to the ozone generator. Odor of drinking water prior to filtration breaks up larger organic carbon molecules into smaller molecules that are more easily metabolized by bacteria. Waters with higher levels of bioavailable organic carbon have been linked to biofilm growth and instability in the distribution system. This project converts the DVWTP’s existing dual-media filters into biological filters, which allows the biological population in the filters to degrade organics as the water is filtered through the granular media, reducing the amount of bioavailable organic carbon in the treated water. Prechloramination and pH Adjustment: Low doses of chlorine and ammonia, as well as carbon dioxide, are added to the raw water. Chlorine and ammonia combine to form chloramines, while carbon dioxide lowers and stabilizes the raw water pH. Prechloramination and pH adjustment/stabilization help to control the formation of bromate, a byproduct of ozonation, and enhance the performance of downstream treatment processes.

Biological Filtration

The ozone-in-oxygen gas mixture is bubbled into the pretreated raw water at two ozone contactor basins. The ozone contacting process provides primary disinfection in the DVWTP’s treatment train. Disk-style ceramic fine bubble diffusers provide constant and uniform distribution of the emergent diffused ozone-oxygen bubbles. The basins have internal baffles that facilitate an efficient hydraulic flow path and ensure that the ozone contacting process meets disinfection contact time requirements. Ozone Oligafs Destruct: Not all of the applied ozone gas reacts with the raw water. Unused ozone gas, called ozone offgas, is collected in the sealed headspace of the ozone contactor basins and treated by an offgas destruct system. Each offgas destruct unit consists of a blower that draws ozone offgas from the headspace of the contactor basins through a heater and catalyst bed, converting ozone into oxygen. The resulting ozone-free oxygen gas is continuously monitored and discharged to the atmosphere above the contactor basins. Monitoring and Control: The ozone-in-water residual is continuously monitored by DVWTP’s automatic analyzers and control systems at various sampling points along the ozone contactor basins. The control system continuously calculates the disinfection compliance ratio achieved by the ozonation process and automatically adjusts various parameters, such as the ozone dose, so the ozonation process complies with disinfection requirements.

Emergency Power

Because the ozone system is critical to providing disinfection of the DVWTP’s treated water, a new 1500 kW emergency generator is installed to provide power to the ozone equipment, as well as other plant equipment, during an interruption of utility power. This emergency generator will start automatically when power loss is detected and will supply the emergency circuits via an automatic transfer switch. It will start and provide power within 10 seconds or less of losing the normal power source. Ozone Life-Safety System

An extensive life-safety system detects any ozone or oxygen leaks and prevents plant personnel from exposure to ozone gas. This system includes ozone and oxygen leak detection monitors, emergency alarm systems, ventilation equipment for ozone areas, and automatic sequences in the plant control system to issue alarms and/or initiate equipment shutdown in the event of a leak. The life-safety equipment and instruments are connected to the emergency power system, allowing them to function even during a utility power interruption.