

## CASE STUDY

### Los Angeles Department of Power and Water (LADWP) Containerized Microclor®

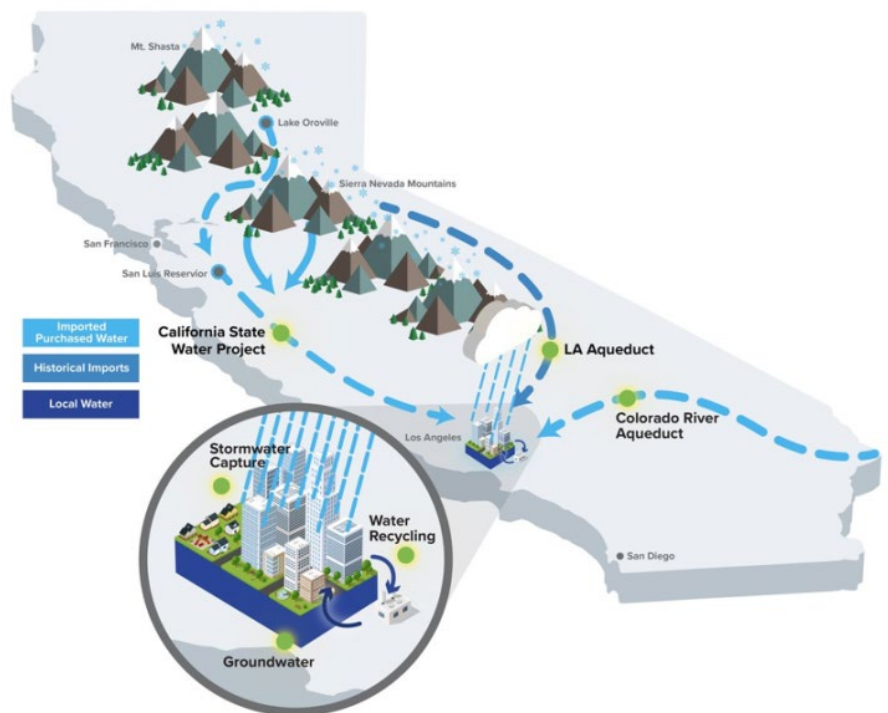
Early adopter, LADWP, sees the economic value and safety benefits of deploying containerized On-Site Hypochlorite Generation (Microclor®) Systems to accelerate project completion and operation while maintaining water quality.



## OVERVIEW

LADWP is the largest municipal utility in the United States. Their power system provides about 8,100 megawatts of dependable electric capacity and their water system serves an average of 450 million gallons of water per day to more than 4 million residents of Los Angeles, its businesses and visitors. Supplying water to Los Angeles since 1902 and electricity since 1917, LADWP has continually evolved to meet the needs of its customers and provide reliable water and power service in a cost-effective and environmentally responsible manner.

LADWP supplied about 197 billion gallons of water annually for the City of Los Angeles' 676,000 residential and business services from 2007 to 2011. The average resident uses about 140 gallons of water daily. The availability of water has significantly contributed towards the tremendous growth and development of Los Angeles. Since 1902 when the population in Los Angeles was approximately 146,000 to today when the population is approximately 3.8 million, the LADWP has worked hard to ensure that Angelenos receive a safe and reliable water supply. Groundwater is the City's primary source of local water supply. It has provided nearly 30% of the City's total supply during water shortages when imported supplies become unreliable. In recent years, contamination has impacted the City's ability to fully utilize its local groundwater entitlements. LADWP has planned to construct treatment facilities for the clean-up of the San Fernando Groundwater Basin to restore this valuable resource. In addition, the City of Los Angeles continues working on maintaining a reliable source of supplemental water supply from the Metropolitan Water District of Southern California (MWD). MWD has been a reliable supplier of water to the City and is a critical part of its long-term water resources plan. That said, MWD is constantly facing supply reliability challenges. Environmental and infrastructural issues have curtailed pumping from the San Francisco Bay-Delta for MWD's State Water Project supply. And prolonged dry period beginning in 1999 on the Colorado River system, and Arizona and Nevada using their full apportionment of Colorado River water are also issues associated with MWD's Colorado River Aqueduct water.



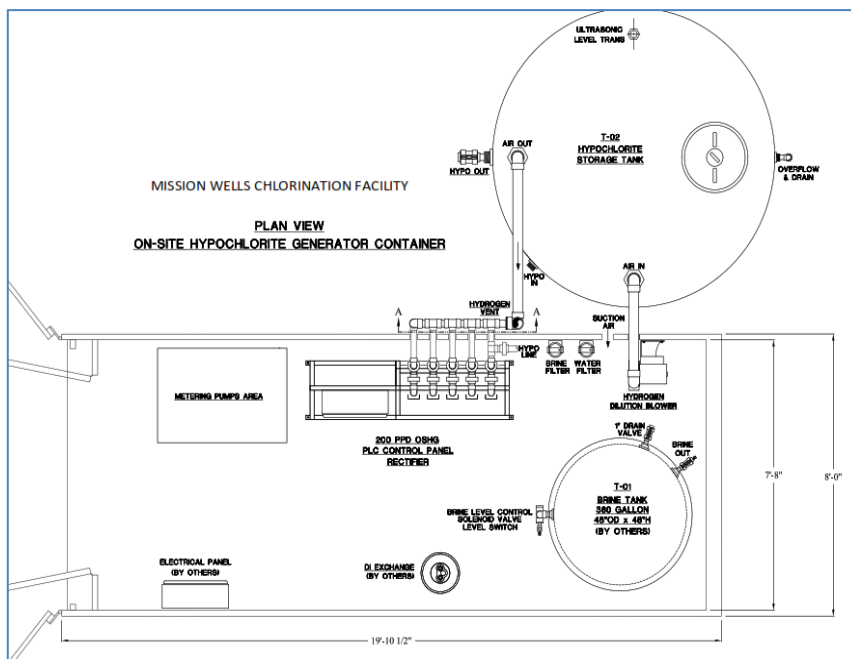
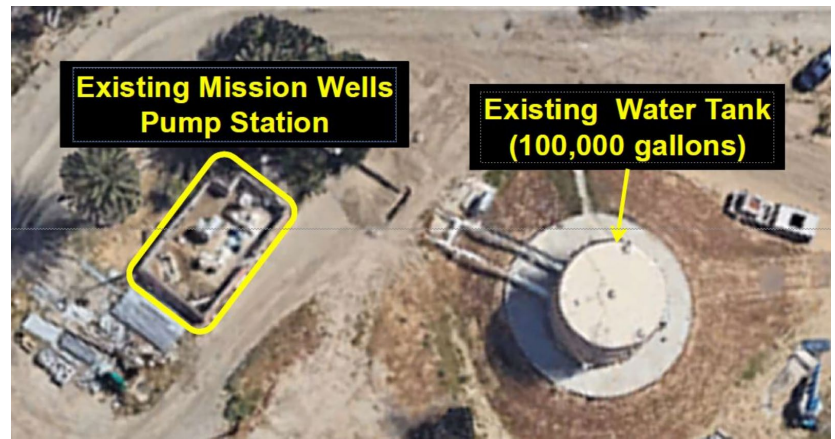
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In 2009 LADWP embarked on an upgrade project for their Mission Wells chlorination station, located in the northeast section of San Fernando Valley at 12331 Havana Avenue, Sylmar, California. . In addition to weighing the economic risks and benefits of various disinfectant alternatives, including: keeping the chlorine gas system operating as is; upgrading the existing chlorine gas system; converting to commercial strength sodium hypochlorite; converting to on-site generation of chlorine gas; and converting to on-site generation of sodium hypochlorite (created by using electricity to turn table salt into a 0.8% free chlorine solution), LADWP was also keen to reduce installation scope and complexities and to simplify its operations at Mission Wells. The containerized Microclor® OSHG solution just requires access to power and water supply and salt to activate. Deployment and operation time cycles are significantly accelerated.

As a result of its internal analyses, in early 2010 LADWP released Bid #84617 for a containerized On-Site Sodium Hypochlorite Generation system, which was later awarded to PSI Water Technologies, Inc. (a cleanwater1 company). Shortly after contract award, PSI delivered its containerized Microclor® OSHG system (see below layout drawing) for installation at LADWP's Mission Wells chlorination facility. The containerized Microclor® system was sized to include one 200 pound-per-day chlorine generation skid and sodium hypochlorite chemical storage tank.

PSI provided project management support during the construction phase, as well as training, start-up, and commissioning of the new secondary disinfection system. Since start-up, Mission Wells chlorination station operators have observed numerous measurable advantages with the new system. The 0.8% sodium hypochlorite (bleach) produced by the Microclor® OSHG system is less reactive and more stable over time, versus highly concentrated bulk bleach. This steady source of consistent-quality sodium hypochlorite has improved control of the chlorination process. In addition, the switch to OSHG means the City is no longer required to register with the CalARP program, saving hundreds of staff hours previously dedicated to compliance, reporting, training and audits.



Thanks to the containerized Microclor® OSHG system, LADWP's Mission Wells chlorination facility has a safe and reliable source of chemical disinfection that has simplified operations. This system continues to operate to this day.

Ultimately, LADWP will upgrade its Mission Wells chlorination facility to provide chloramine disinfection to the groundwater supply. This is a final phase of a comprehensive city-wide program to switch from chlorine to chloramine as the secondary Mission Wells chloramination station disinfectant for the city's water supply (and provides compatibility with water purchased from the Metropolitan Water District). Conversion to chloramine treatment is being achieved by adding ammonia to chlorine, and it is LADWP's response to comply with the drinking water regulation, known as the US EPA's Stage 2 Disinfectants and Disinfection Byproduct (D/DBP) Rule.