

Water/Wastewater Case Study:

North Tahoe Public Utilities District (PUD)

Background

- Type of Agency: Water
- Location: Placer County, Calif.
- Population Served: 1,144
- Water Connections: 3,534
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Summary

When the U.S. Environmental Protection Agency (EPA) passed the Enhanced Surface Water Treatment Rule, which stated that surface water had to go through a filtration process, North Tahoe Public Utilities District (PUD) chose to install an ultraviolet (UV) treatment system for disinfecting its fresh-water supply. In designing the UV plant, North Tahoe PUD was mindful of the opportunities for water and energy efficiency. The utility also launched a public outreach effort to promote water conservation. North Tahoe PUD distributed literature published by American Water Works Association and provided tours/field trips of its facility to elementary school students during Water Awareness Week in the spring.

Referenced in Water/Wastewater Guides:

- #1, "Reduce Energy Use in Water and Wastewater Facilities Through Conservation and Efficiency Measures"
- #2, "Promote Energy Conservation and Efficiency Through Public Outreach, Incentives and Assistance"

Plan

North Tahoe PUD found that UV was the least costly technology (in terms of capital and annual O&M) of the treatment technologies evaluated in a 1999 report. Estimated power costs ranged from a low of \$6,700 per year for UV, to a high of \$26,000 for membrane filtration. Ozone treatment was the next lowest cost alternative, but energy/operations would be more intensive.

In 2000, North Tahoe PUD's internal engineering department subcontracted design and construction-management work of the UV disinfection plant to an external consultant, Eco:Logic. Eco:Logic was awarded the contract because of its knowledge of the North Tahoe district and of technical aspects of the UV treatment system.

North Tahoe PUD and Eco:Logic worked together to analyze the feasibility of the UV system, which also had to be approved by the Department of Health Services because it was to be the first time that the system would be used to treat potable water in California. Full-scale bioassay testing will be conducted in 2002 to confirm the UV system's performance. North Tahoe PUD considered the following in planning for the UV system:

- Fresh water may not always be safe to drink because sewage or industrial waste may contaminate it. Ultraviolet disinfection is much safer to the environment and does not leave or produce any chlorinated toxic compounds in the water because it is not a chemical additive. A UV lamp disinfects the water passing over it by altering the DNA within the bacteria, viruses and protozoa, which effectively renders them harmless.
- UV was an appropriate technology because light could easily pass through the water in Lake Tahoe (which is naturally of high quality). UV is a very effective disinfectant at high-water transmissivity (ability of UV light to pass easily through the water; UV is not absorbed by substances in the water).

Construction took place September 2001 to October 2001. The UV plant went online in May 2002. The design process was on a fast track (three and a half months).

Programs: Efficiency

✓ **New construction:** UV disinfection plant: Water is pumped out of Lake Tahoe, passed through a 60-inch diameter pipeline to provide chlorine contact, passed through 10 micron mechanical screens to remove particulate matter and passed through two UV reactors before getting pumped to the water distribution system. The UV disinfection plant consists of:

- Variable frequency drives (VFDs), which offer a “soft start” capability, gradually ramping up a motor to operating speed.
- Sixteen UV lamps were installed (four 2.8 kW lamps/tubes in each of the plant's four reactors). Only eight lamps are on at one time. Each tube has a life of 5,000 hours.
- Two parallel treatment trains, each with a rated capacity of 1,600 gallons/minute; 2.3 million gallons a day.

Programs: Public Outreach

✓ **Brochures:** North Tahoe PUD distributed American Water Works Association (AWWA) literature to elementary schools and actively promoted water conservation with literature about free efficient shower heads, toilet controls and water use in homes. Literature was provided on request and kept available in the district office.

✓ **Tours:** Provided tours of its facility to elementary school students during Water Awareness Week (in the spring).

Budget and Finance

The total construction cost of the UV disinfection plant was \$3.1 million. The project was financed by the utility's capital fund. The replacement cost for each tube was \$600. Lamps ran at variable power to supply required dose, 30 percent power output is typical. Cost for lamps was approximately \$400,000. Approximate cost of VFDs was \$15,000 to \$20,000.

Results

The UV disinfection plant was estimated to save \$6,700/year in power costs. The Leak Detection Program saved 819.6 GPM and \$430,781,760.