



2012: Top Water Quality Projects

The *Water Quality Products* staff celebrates the best water treatment projects of 2012 with the third annual Top Water Quality Projects awards. The program recognizes the most innovative and challenging projects submitted by readers.

This year's projects come from across the U.S. and address a range of

issues. From groundwater contaminant removal to reverse osmosis, they demonstrate how companies are employing innovative technologies to solve water treatment problems.

We extend our appreciation to all of the representatives who submitted projects, and congratulate those whose projects are honored in this special section.

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Hanford Site Groundwater Remediation

Along the Columbia River sits the Hanford Site, a facility used to produce plutonium for atomic bombs during the Cold War. To cool the facility's nine nuclear reactors, sodium dichromate—a chemical used as a corrosion inhibitor—was added to river water. Due to leaks in the sodium dichromate transfer systems and piping, and because cooling water treated with sodium dichromate was periodically discharged into the soil near the reactors, the soil and groundwater became contaminated with hexavalent chromium (chromium-6).

To protect the local environment, the U.S. Department of Energy (DOE) needed to reduce the chromium-6 levels in the groundwater entering the Columbia River. It tried various methods, including precipitating the contaminant "in situ," but eventually resorted to offsite treatment. The first pump and treatment system were installed in 1996.

While previous technology reduced the chromium-6 levels to 5 ppb, the search continued for better equipment.

The DOE and contractor CH2M HILL first looked at using ResinTech Inc.'s media in 1998, but the company felt it was too expensive. Offsite regeneration of the strong base anion resin, however, became increasingly problematic; and although an onsite regeneration system was built, issues associated with wastewater treatment and disposal made it prohibitively expensive.

In 2008, the DOE began seriously considering ResinTech's SIR-700 product. Based on the success of extensive pilot testing, the product was adopted for full-scale implementation in 2009, and older systems were retrofitted in 2011.

The system has been successful in removing chromate from the soil and groundwater, reducing chromium-6 at the Hanford site to non-detectable levels, and slowing the rate at which chromate is moving toward the Columbia River.

In August 2012, Tracy Mustin, principal deputy assistant secretary for environmental management for the DOE; Jane Hedges, program manager for the Washington State Department of Ecology; and Dan Opalski, director of the U.S. Environmental Protection Agency (EPA) Region 10 Office of Environmental Cleanup, attended a celebration recognizing the beginning of operations at the plant.



Location: Richland, Wash.
Size: 600 gpm
Cost: \$240 million
Designer: CH2M HILL Plateau Remediation Co.
Contractors: CH2M HILL
Owner: U.S. Department of Energy

Transformers Attraction RO System

When a major California theme park needed a way to provide high-quality reverse osmosis (RO) water for special effects and 3-D eyeglass washers for its new Transformers attraction in May 2010, it approached Eversoft Inc. to take on the challenge. The project required treating water to reduce total dissolved solids (TDS) to 4 ppm or lower, and creating a way to reclaim final rinse water and reuse it for wash water.

Eversoft offered a variety of solutions, including deionization exchange tanks, but that method proved too costly. Eventually, both parties were able to agree on a solution that utilized Axeon 2,500- and 7,000-gal-per-day RO units that could provide the low TDS required.

Eversoft also utilized different methods of filtration and disinfection to reclaim the rinse water for reuse.

Once Eversoft finalized the design and the equipment was ordered, it was a race to the finish line. Although the projected timeline of the project from design phase to startup was one year, contractors discovered that they had only six months to complete the project. When the equipment arrived, construction began moving at a rapid pace, with parameter and design changes occurring simultaneously with production. Due to the design changes, concrete pouring had to be halted so that plumbing could be laid.

At project completion, the parameters were not only met, they were exceeded. Eversoft was able to achieve 1 to 3 ppm total dissolved solids (TDS) from a single-pass RO system, and there has not been a dropoff in performance since the project was completed in September 2011.



Location: Universal City, Calif.
Size: 4.5 gpm
Cost: \$65,000+
Contractor: Eversoft Inc.

Ft. Stewart Potable Water Treatment System

When potable water demands increased at the Ft. Stewart army base in Savannah, Ga., the U.S. Army Corps of Engineers enlisted WaterProfessionals to handle the design and installation of a complete potable water treatment system.

Due to the limited data that was available about the area's underground aquifer at the time, the initial parameters for the system were 1,500 to 2,000 ppm TDS—well above the secondary EPA drinking water limit of 500 ppm—20 to 25 ppm silica, 100 to 175 ppm alkalinity and 290 to 320 ppm sulfate.

To bring the system into compliance with EPA standards, the contractors initially decided to replace the old system with RO systems to treat 75% to 85% of the well water, which would then be blended with 15% to 25% untreated well water.

But once the well was drilled, the unanticipated hardness levels proved to be a challenge for the RO systems, resulting in TDS levels well above EPA standards. Also, minerals with low solubility, such as sulfates, precipitated and formed scale on the membranes. Scale minimization using chemical antiscalants resulted in frequent membrane cleanings and reduced membrane life.

WaterProfessionals' solution was to soften 50% of the raw water stream, while lowering hardness concentrations to a level that made antiscalants effective. A triplex system, utilizing three 84-in.-diameter softeners, each containing 120 cu ft of cation exchange resin and a brine silo, were delivered and installed. In order to treat the required 300-gal per minute (gpm) continuous and 600 gpm peak flow of RO water, and to allow for some redundancy for the potable water plant, two 300-gpm RO units were installed.

After working under severe time constraints—a pressing 12-week delivery deadline—and with a challenging raw water supply, WaterProfessionals provided a treatment system that created finished well water meeting EPA and state of Georgia standards.



Location: Savannah, Ga.
Size: 800 gpm
Designer: WaterProfessionals
Owner: U.S. Army Corps of Engineers