LOS ANGELES DEPARTMENT OF WATER AND POWER, CALIFORNIA

Integration of Enhanced Coagulation at the Los Angeles Aqueduct Filtration Plant

HIGHLIGHTS

- Development of design criteria for the largest arsenic treatment facility in the U.S.
- Big picture approach also considered impacts on bromate, DBP, and CT compliance.
- Process optimization of chemical types, dosages, and filter configurations.
- Evaluation of near-zero arsenic removal technologies.

The Los Angeles Department of Water & Power (LADWP) selected a team that included Carollo to conduct bench- and pilot-scale testing on their current and future sources of water (i.e., Los Angeles Aqueduct (LAA) water, State Project Water-West Branch, and future State Project Water-East Branch). LAA water contains arsenic in concentrations ranging from 10 to 70 ppb, with an average concentration of 25 ppb. A single "hot spot" far away in the Sierra Mountains is the primary contributor to the Department's arsenic problem. Hot Creek near Lake Crowley, though contributing less than 5 percent of the Los Angeles Aqueduct Filtration Plant's (LAAFP) total water supply, adds enough arsenic to the LA Aqueduct that arsenic concentrations at the intake of LAAFP are in excess of 10 ppb.

Carollo developed detailed design criteria from bench- and pilot-scale studies that will help the 600-mgd LAAFP address arsenic removal.

Currently, the Cottonwood facility, located 175 miles north of LAAFP, adds coagulant to the water and settles the arsenic out in the Haiwee reservoir. This practice will likely be discontinued in the future, so all arsenic removal will need to be achieved at the plant to meet the new arsenic Maximum Contaminant Level (MCL) of 10 ppb and the more stringent internal treatment goal of 5 ppb. Hot Creek is located in an environmentally sensitive area, making it difficult to construct an on-site treatment facility. Carollo investigated treatment alternatives to reduce arsenic levels and other key contaminants at the LAAFP plant effluent. Specific issues evaluated as part of the testing plan included:

- Dose-response and floc settling curves when using ferric chloride.
- Ferric chloride dose and mixing optimization for arsenic, total organic carbon (TOC), turbidity, and phosphorous removal.
- Different types of pretreatment, including: acid, ozone, and chlorine dioxide.
- Alternative filter configurations (e.g., deep bed and dual-media filters) for enhanced arsenic removal.
- Filter operation: coagulant dose, filter aid polymer dose, and filtration rate.