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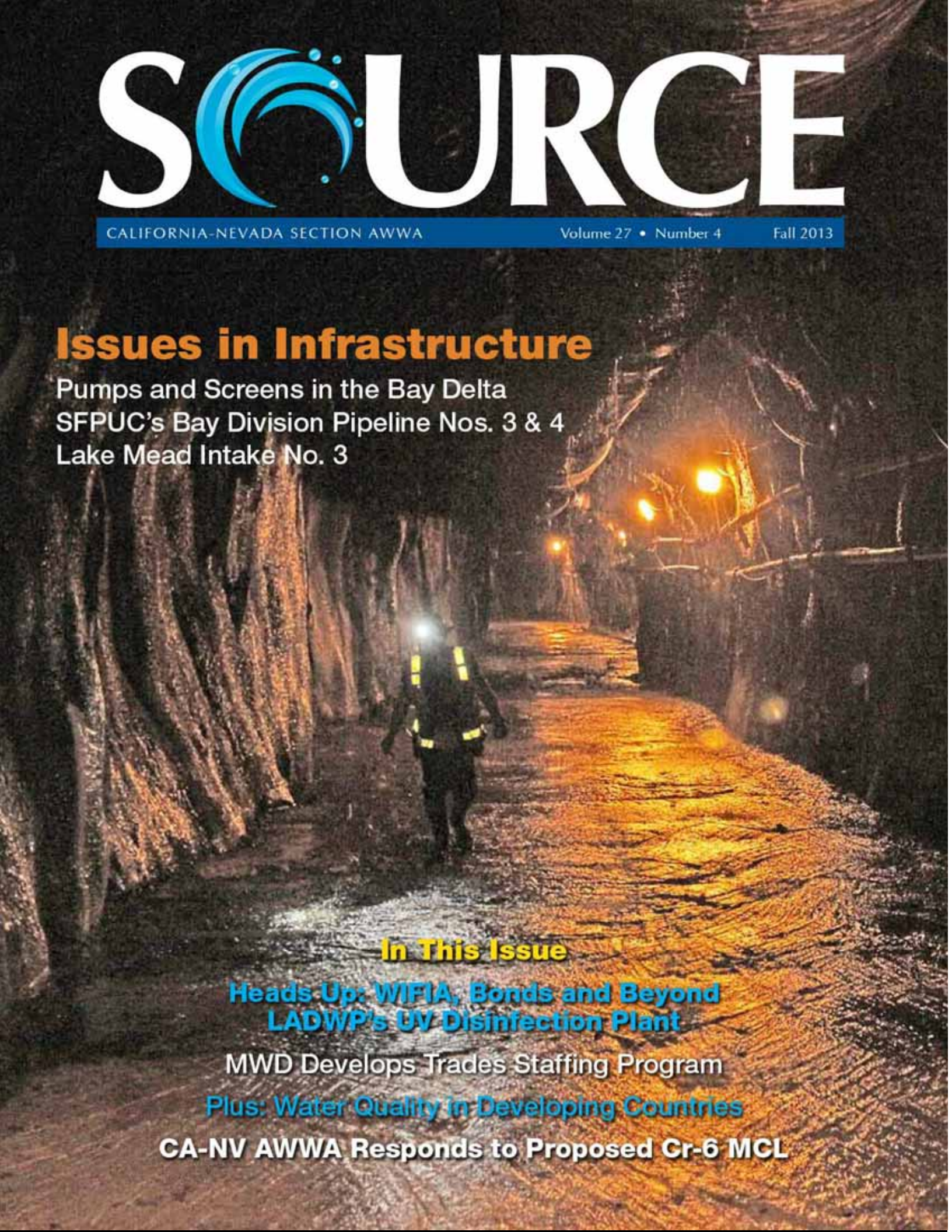

Issues in Infrastructure

Pumps and Screens in the Bay Delta
SFPUC's Bay Division Pipeline Nos. 3 & 4
Lake Mead Intake No. 3

In This Issue

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Steve Ott and Christine Cotton
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Christine is Associate Vice President with Malcolm Pirnie/ARCADIS in Los Angeles, CA. She is the project manager and co-author of the USEPA's Ultraviolet Disinfection Guidance Manual. She has also developed UV disinfection equipment specifications, developed validation protocols, completed validation testing and oversight and UV facility designs, conducted start-up and operations training and completed regulatory negotiations for disinfection credit for several water utilities in the United States.

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LADWP Installs First UV Disinfection Plant

By Steve Ott and Kurt Wells, LADWP, Christine Cotton, James Collins and Ben Kuhnel, Malcolm Pirnie/ARCADIS

Los Angeles Aqueduct Filtration-UV Disinfection Plant: placing the field-fabricated 144-inch diameter inlet and outlet elbows to connect the plant with the water supply system. Insert: Reactor No. 1 being installed.

Billed as the largest ultraviolet disinfection plant in the western United States, the 600 MGD Los Angeles Aqueduct Filtration Plant (LAAFP) — UV Disinfection Plant is rapidly approaching completion. UV disinfection is a part of Los Angeles Department of Water and Power's (LADWP) Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2) regulatory compliance strategy, which also includes converting to a chloraminated water supply.

A chlorine contact tank was originally proposed to provide additional contact time prior to forming chloramines. However, after learning about recent UV technology developments, LADWP re-evaluated that decision and in January 2010 moved to UV treatment to reduce chlorine contact time and disinfection byproducts (DBP) formation.

Although it was granted a two-year extension for Stage 2 compliance, LADWP faced a very compressed schedule for a project of this magnitude in which the utility had very little UV experience. LADWP was fortunate to have an on-call design contract in place with Malcolm Pirnie/ARCADIS U. S. (ARCADIS) and formed an integrated design team. Due to the tight schedule, the design had to proceed prior to UV equipment selection and the design had to accommodate both low-pressure high-output UV lamp and medium-pressure lamp reactors. The UV equipment contract was advertised allowing for either technology with the manufacturer supplying a back-up power generator and an uninterruptible power supply. The equipment bids were evaluated on a life-cycle basis and Calgon Carbon won the contract with its 48-inch diameter Sentinel reactor, which utilizes medium pressure lamps.

ARCADIS' UV expertise proved invaluable during the permitting process with the California Department of Public Health (CDPH). The project team kicked off the conceptual design in June 2010 and using a series of workshops, the design team developed a cooperative relationship with CDPH to move the design through the approval process.

The most important water quality parameter for the UV disinfection plant design is UV transmittance (UVT), which is related to water clarity and UV-absorbing materials in the water. Although historical UVT data are preferred for determining the design UVT, the project schedule limited the collection of UVT data. Additionally, historical LAAFP water quality data includes only blends of Los Angeles Aqueduct (LAA) and California State Water Project (SWP) West Branch water. When the UV plant is operational, a third water source, SWP East Branch, will also be available. An analysis of each source's hydraulic limitations was conducted to determine future water blends. Filtered water UVTs from treatment plants similar to LAAFP were analyzed to predict the LAAFP filtered UVT of each source. Blended water UVTs were then predicted based upon the filtered water UVT data for the LAA and SWP West and East Branches.

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CDPH gave its final approval of the design criteria in January 2011 and LADWP broke ground the following month. The schedule didn't allow time for a design-bid-build process, so LADWP's construction crews are constructing the plant. An essentially in-house design/build has allowed significant flexibility in adjusting the construction schedule.

The project site is wedged into a hillside between the LAAFP and the three-billion-gallon Los Angeles Reservoir. A number of large diameter active and abandoned water supply lines were carefully removed and/or capped during the excavation. The site is also crossed by three earthquake faults, which required additional seismic considerations. The UV building will house 14 UV reactors, 12 to meet the design flow and two redundant units.

In February 2013 two 144-inch diameter 90-degree elbows were installed to connect the UV plant with the water supply system. The compressed schedule did not allow time to purchase elbows, but spare 144-inch pipe segments had been stored nearby since the early 1980's when the pipe for the LAAFP was originally purchased. LADWP personnel field-fabricated the elbows using the spare pipe segments and the elbows were placed during the LAAFP's annual two-week maintenance shutdown and the water supply restored ahead of schedule.

In June 2013 the reactors began arriving, with testing and start-up scheduled for a few months later. The $120 million UV plant is on target to be operating by March 31, 2014 in accordance with the Stage 2 Extension.