Project Profile Central Arizona Project



CAP PUMPING PLANT FIRE PROTECTION SYSTEM UPGRADE PROJECT

Water is one of Arizona's most precious resources and the Colorado River satisfies much of the demand. To meet that demand, the 336-mile-long Central Arizona Project (CAP) aqueduct annually delivers approximately 1.6 million acre-feet of Colorado River Water to cities, Indian Tribes and Farms in Central and Southern Arizona. The CAP consists of 15 pumping plants that lift the water approximately 2,400 feet from the Colorado River to south of Tucson.

When originally built in the 1970s, these pumping plants were protected by conventional fire alarm systems in compliance with the existing codes. As a member of OSHA's Voluntary Protection Programs (VPP), CAP felt the Life Safety of its employees warranted the expenditure to upgrade with today's advanced intelligent fire protection technologies.

PROJECT SCOPE

Chasse Building Team was selected by CAP as the Construction Manager at Risk (CMAR), which sub-contracted CopperState Fire Protection of Phoenix, Arizona to provide solutions from NOTIFIER.

"It was time to take the 30-year-old systems in to the twenty-first century," said CopperState General Manager Tim Snow.

According to Telma Reyes, CAP Contracting Officer, the upgrade included, "the installation of clean agent fire protection systems, wet pipe suppression systems, fire detection and alarm systems and an upgrade of existing CO2 systems. We modified existing damper systems and existing stairwell pressurization systems as well. Louvered doors were also replaced with solid panel doors. We prepared as-built drawings of all changes and additions."

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CopperState retrofitted four plants, installing new addressable fire alarm systems with a NOTIFIER NFS2-3030 control panel at the head end of each system. As one of the fire industry's largest capacity fire alarm control panels, it can support up to 3,180 addressable devices and includes a modular design for easy expansion and tailoring.

Standardization of the systems across the plants is an operations and maintenance goal that was definitely obtained by the versatility of the new systems, according to CAP Senior Project Manager Michael Pierce.

"We started out with a cookie-cutter design for each plant, but quickly found out each has its own idiosyncrasies," Pierce said. "You need to know your system and pay close attention to details, especially in the design review phase."

Although the purpose of the upgrade was improved life safety, protecting the pump motors, CAP's biggest assets, was a major objective. Four of the CAP pumping plants located in central and western Arizona are of similar capacity and design. Each plant has 10 pump units of various sizes ranging from 1,500 to 9,000 horsepower each. Each unit is protected by its own High Pressure CO2 fire suppression system, which is monitored and controlled by either an NFS2-640 or NFS-320 fire alarm control panel from NOTIFIER. All fire alarm panels are networked with the main NFS2-3030 panel to allow monitoring, response and maintenance.

Because these pumping plants were constructed with concrete walls up to 48" thick, rigid conduit raceways were installed by the CMAR for the fire alarm cabling used to transport high-speed data between the new NOTIFIER fire alarm control panels via the NOTI-FIRE-NET network. While each panel operates independently, this exclusive networking solution ties all panels together for easy monitoring of the entire network from one or multiple locations over hundreds of miles.

The plants motor rooms utilize NOTIFIER Acclimate Plus detectors, an intelligent device that uses a combination of photoelectric and thermal sensing technologies for increased immunity to false alarms. Unlike traditional intelligent detectors, the Acclimate Plus has a microprocessor in the detector head that processes alarm data. As a result, the device adjusts its sensitivity automatically, according to the environment, and without operator intervention or control panel programming.

Intelligent devices, such as the Acclimate Plus detector, utilize the patented FlashScan communication protocol, which was developed to speed communication between control panels and analog intelligent devices.

To protect the fire alarm controls in this industrial environment, CopperState customized industrial grade Hoffman NEMA 12 enclosures for many of the panels. The enclosures allow local maintenance staff to view alarm system status easily.

As a member of OSHA's VPP, CAP facilities meet or exceed health and safety standards, and maintain injury rates well below National Bureau of Labor Statics rates.

"We required a lot of extensive testing and had to make a number of changes throughout the installation process," says Craig Truax, CAP Electrical Controls Engineer. "If you're going to take on a project of this magnitude, having a contractor that's competent and willing to go the extra mile to meet your requirements is important."

MONITORING & MAINTENANCE MADE EASY

One of the most evident changes was the improvement in communication of alarms between the CAP headquarters in Phoenix, Ariz., and the four upgraded CAP plants.

The NOTIFIER ONYXWorks graphic workstation allows facility management and security personnel to view the status of all fire alarm and fire suppression networks throughout the four pumping plants. Through CAP's existing Ethernet infrastructure, the ONYXWorks graphic workstation receives data from each plant's fire alarm network twenty-four hours a day, seven days a week over IP, allowing CAP personnel to view all system points, alerts and alarm events in real-time.

"Our facilities are so remote that coordinating the communications of alarms is key," states Justin Larsen, CAP Lead Project Mechanical Engineer." By avoiding having personnel drive hours to check on a plant, this centralized system will save a lot of labor when it comes to monitoring and maintaining these systems."

In conjunction with the monitoring centralization of all plant fire protection networks, CopperState configured CAP's ONYXWorks workstation to serve as a single source of control and supervision for the execution of:

- "Lock Out Tag Out" procedures when maintenance is required on the ten (10) CO2 systems and two (2) clean agent fire suppression systems
- Evacuation measures during a plant emergency which may not be fire alarm related
- Control and monitoring of the Stairwell Pressurization system
- Monitoring and Control of all Fire Smoke Dampers
- Monitoring and Control of the plant Fire Pump
- Monitoring and Control of Plant Pump Units 1 thru 10 for Motor Differential Operations

CAP is authorized to act as its own Authority Having Jurisdiction (AHJ). Additional fire protection consulting, inspection and certification services were provided by Rolf Jensen & Associates, Inc. of Phoenix, Arizona. All fire alarms, sprinkler supervision and CO2 systems were tested for compliance to NFPA 13 and NFPA 72 standards.

POTENTIAL ADVANCEMENTS

The fire alarm and suppression systems at the remaining 11 CAP plants are scheduled to be upgraded over the next four years. Due to the simplification of fire alarm monitoring and control that CAP has gained through the NOTIFIER ONYXWorks system, CAP has planned for one workstation to be installed at each plant.

Through the ONYXWorks platform, authorized CAP personnel will have the ability to broadcast messages to all or specific areas of a facility using audio and visual notifications; send distributed recipient messages such as emails and computer pop-ups; and even broadcast announcements for miles outside of the plant. **<Read Full Case Study Here>**

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