

SOLVAY SYSTEM MIGRATION DOESN'T MISS A BEAT

The Wyoming Trona Ore Mine and Refinery Upgrade from Yokogawa Centum CS3000 to Centum VP-R5 Involved Two Domains, 21 RIO and FIO Field Control Stations, 17 Operator Stations, Six Engineering Stations and Eight Different Plant Servers

by Jim Montague

The best process controls upgrade project is one that's so seamless, most people don't even know it's going on, according to Kevin Kelley, process control foreman at Solvay Chemicals.

It might seem impossible for such a huge, fast-moving and critical project to be so stealthy, but that's exactly what happened earlier this year at Solvay's trona ore mine and refinery in Green River, Wyoming. The facility migrated from Yokogawa Corp. of America's Centum CS3000 distributed control system (DCS) to its new Centum VP-R5 control system, and updated 21 field controllers and numerous other support components.

"We'd migrated from Honeywell's TDC to Yokogawa's CS3000 in 1998," said Kelley during his Sept. 9 presentation at the 2014 Yokogawa Users Conference and Exhibition in Houston. "So we had to upgrade now because our Microsoft Windows XP components were no longer supported in 2014, and their costs were going to go way up. We were scheduled for a five-year, total plant outage, and we needed to update our RIO field control

stations with new templates and offline downloads that had never been done since they were initially installed. Also, we had an old infrastructure with PCs that were seven years old, so we were having frequent hardware failures. We also needed to upgrade our system security to meet Solvay's overall corporate IT standards."

Solvay's control system at Green River has about 7,000 individual, hard-wired I/O points and about 3,000 communication I/O points for its SCADA system, PLCs, Honeywell FSC system and other packages. Its controls cover processes that are up to 20 miles apart, and its Yokogawa system resources include two domains, 21 RIO and FIO field control stations, 17 operator stations, six engineering stations and eight different plant servers.

WORLD'S LARGEST TRONA TROVE

All of these control systems and devices help extract and process Green River's



"For the total upgrade, we experienced no loss of production, and the plant came back online without any problems. Next, we're undertaking a project to convert our graphics from the old 1990s style to more high-performance, alarm-oriented graphics." Kevin Kelley, process control foreman at Solvay Chemicals.

abundant trona ore, which contains sodium sesquicarbonate, a relatively rare, sodium-rich mineral that's used to make soda ash. The mine and refinery's trona reserve in southwestern Wyoming is the largest and purest in the world. In fact, it contains 80% of the world's trona with more than 100 billion tons, including 40 billion tons that can be mined with conventional methods.

"The 10-foot seam we're currently mining is 1,600 feet below the surface and is 10 feet thick," reported Kelley. "We use four continuous bore miners to do room-and-pillar mining. They cut curved tunnels that are 8.5 to 9 feet high and 14.5 to 15 feet wide. We also do long-wall mining with equipment that's 10 to 11 feet high and 625 feet wide, and creates tunnels that are a mile long. We mine about 11,000 tons of ore per day from the mine."

Kelley added that the Green River facility also is defined as a hard-rock, gassy mine because its operations also free about 6 million cubic feet of natural gas per day, which must be vented to keep the

atmosphere in the mine at less than 2% methane. Solvay used to simply burn off this gas, but it recently implemented a capture system that gathers the natural gas from its long-wall operation and uses it to help run its refinery. "We were the first in the U.S. to use our waste natural gas as fuel, and we've been doing it for a couple of years," said Kelley. "We compress the 96% to 98% pure natural gas to about 70 psi, and send it to our kilns to subsidize our gas use, which gives us some carbon credits too."

Once the trona ore reaches the surface, it's crushed to 1/4 inch or less. Next, it's run through one of four calcination lines that cook the rock at 350 °F. Then water is used to leach out about 6,000 tons of pure trona per day. The resulting liquor is heavy with sodium sesquicarbonate, which is filtered, crystallized and dried into soda ash. This product is an essential ingredient in glass containers and other products, chemical manufacturing, soaps and detergents, flue gas desulfuring, pulp and paper, water treatment and other

products and processes. The refinery also produces sodium sulfite and sodium bicarbonate.

MIGRATION IS ALL ABOUT TIMING

To keep its operation running smoothly, Kelley explained, "Our biggest challenge on this upgrade project was timing. The plant shutdown was scheduled for the last week of April 2014, and our total plant outage was the first Saturday and Sunday in May. However, although funds were slated for the upgrade two years ahead of time, they weren't fully committed until the first week of February 2014, making the purchasing process difficult and putting Yokogawa's standard lead time well past the shutdown deadline. This also made it difficult for us to have the time to install the needed upgrade to infrastructure, cabinets, switches, UPS racks, etc. Fortunately, Yokogawa worked very hard with us and went out of their way to meet our deadlines. The Yokogawa hardware arrived just in time to be installed." ■