Powering Your Plant's Reliability

Like many expanding suburbs, Camas, WA faced the problem of how to update an aging infrastructure-in particular, its sewage collection system-to meet the needs of the city's growing population.

Located on the north bank of the Columbia River (adjacent to Portland, OR and Vancouver, WA), this ecologically sensitive town couldn't risk any kind of sewage backup, which was a real possibility if the electric utility serving its several lift stations failed. To increase reliability and safety, the city specified that each new lift station must incorporate a standby power generator from Cummins Power Generation [1].

For most of its history, Camas (population: 15,000) relied on gravity-fed lift stations to propel sewage to the treatment plant. But by the 1970s, the city had grown up, over and beyond Prune Hill, a ridge to the north, and pressure systems became a necessity. Now Camas has a total of 20 lift stations; of those, 7 are brand-new pre-engineered lift stations.

"We had eight or nine older lift stations," says Jim Dickinson, wastewater operations supervisor for Camas, "and they had all been designed differently, making them time-consuming for our crews to maintain and repair. Since about 2003 we have been retrofitting existing lift stations and installing new ones in new subdivisions and developments. The new lift stations are pre-engineered and include a Cummins Power Generation standby power generator."

Pre-engineered For Reliability

Camas city engineers set several requirements when they began replacing the lift stations. Reliability, easy maintenance, and consistency of design and performance were top of list. Each lift station is pre-engineered by Romtec Utilities to meet those requirements.

A pre-engineered lift station includes:

- A wet well.
- Two or three submersible pumps.
- Piping.
- Liquid-level sensors.
- An underground valve vault.
- Electric pump controls.
- A standby power generator and an automatic transfer switch.
- Communication equipment.

All of these components, including structural, mechanical, electrical, power generation and communications, are pre-engineered and delivered as one package,

not to mention they can be installed in about a week. The result is consistency of design and equipment.

These benefits, plus speed of installation, led Romtec to choose Cummins Power Generation for its standby systems. "We chose Cummins Power Generation for the same reason cities choose us," explains Mark Sheldon, vice president of marketing and sales, Romtec Utilities.

"They receive our requirements and respond quickly with the right generator set and transfer switch, and they make installation and maintenance very easy. Our systems pump lots of water against friction losses, dynamic head and other factors, and that requires a sharp analysis to specify the right size generator."

Critical Performance Parameters

The diesel-powered standby generator sets at the Camas lift stations range-from 20 to 200 kW-and are either permanently installed or portable trailer-mounted units. The power output specification depends primarily on the size of the pump at each lift station, which ranges from 11 to 35 HP. For example, at the Hunter Ridge lift station, twin pump motors require 39.6 kW for starting and 22.5 kW for running.

All of the lift stations are required to run both pumps simultaneously if necessary. Besides pump motor horsepower and voltage, other critical performance parameters involve:

- Starting current.
- Motor efficiency rating.
- Required auxiliary loads, such as generator set controls, lights, heaters and odor control.
- An ambient temperature range, in addition to elevation above sealevel.
- Compliance with pollution control requirements.

From these parameters, Jim Stalnaker, Cummins Northwest sales manager, determines the engine, alternator and excitation system for each new lift station. "Some generator sets need to be oversized to handle a motor's higher starting current," he admits. "But oversizing can some times be avoided by specifying variable-frequency drives or solid-state starters to reduce the inrush of current during starting."

Transferring Power Smoothly & Safely

Camas lift stations include Cummins Power Generation OTEC open transition transfer switches, which provide safe break-before-make power transfer from the grid to the generator and back again for both testing and power outages.

Leaving a programmable gap of several seconds between power sources allows the back-EMF generated by the lift station's pump motors to fully dissipate, which is important to protect the generator set's alternator. The time gap further permits the generator set to achieve operating speed and stabilize its output voltage. The gap between power sources can be programmed into the OTEC switch to accommodate

the parameters of the motors and generator set in each specific lift station.

Unobtrusive But Protected Generator Sets

All of the generator sets are also installed in sound-attenuated enclosures so that they don't disturb the community. "In addition to a low-noise requirement, another 'must' for the new lift stations is to use the smallest amount of space possible-some times just 1,000 square ft.," says Sheldon.

Diesel-powered generator sets are installed where possible. Their efficiency reduces footprint and fuel storage requirements. However, natural gas and propane are also used as a fuel source if those fuels are readily available at the site.

Putting It All Together

Only after each lift station is installed does the real work begin for Camas wastewater operations staff. It's their job to maintain each of the lift stations; easy maintenance and high reliability help reduce the time they spend in the field.

"We rely on Cummins Power Generation not only to design, specify and install the generator, but also to train the operator," according to Sheldon. "These combined factors give us the reliability to know that Camas will keep pumping, whether or not utility power is available."

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