BY TONY ALVELO

Commonwealth Chesapeake operators reviewing vibration data on one of the plant's generator lubricating oil pumps.

PM for Peak Power

When Commonwealth Chesapeake is called on for power, the operators must be confident that the plant can deliver

Commonwealth Chesapeake Co. LLC is a Virginia, U.S.A.-based power generating company that operates the Commonwealth Chesapeake Power Station, a combustion turbine peaking plant fueled by low-sulfur fuel oil that was sold to Tyr Energy Inc. in February 2008.

The Chesapeake Power Station includes seven GE LM 6000 simple-cycle gas turbine electric gen-sets that are able to produce 315 MW of electricity — enough to meet the energy needs of approximately 300 000 households. The plant delivers energy to PJM Interconnection, a regional transmission organization (RTO) that coordinates the movement of wholesale electricity to large areas in the East, Northeast and Midwest.

The plant was built in two phases — the first in 2000 and the second in 2001 — on a 51 hectare tract on the Delmarva Peninsula, a large peninsula on the East Coast of the United States, occupied by the states of Delaware and portions of Maryland and Virginia. Three generators were installed in the first phase and four more were brought online in the second phase. The plant features "spinning reserve" capacity on four turbines to provide a ready and reliable regional power source.

As a peaking plant, Commonwealth Chesapeake's turbines are not running constantly, but it's critical that they be in top condition in order to supply reserve energy with very little notice, and often times in emergency situations. Within the first few years of operation, Commonwealth Chesapeake initiated a comprehensive machine condition monitoring program aimed at ensuring the reliability of critical equipment, enabling it to get out ahead of major repairs.

In 2002, Azima DLI, a global condition monitoring services company, and strategic partner PdM Solutions were brought onboard by Commonwealth Chesapeake to help develop its in-house vibration analysis program. The plant is currently using an Azima DLI data collector and the company's analytic software, along with training and support from PdM Solutions.

Commonwealth Chesapeake faces several challenges with its vibration data collection program. In an ideal world, the plant's team of equipment operators would take readings every quarter and come back with recommendations such as the need to monitor a particular bearing or issue a mandatory replace order. But because its equipment isn't running 24/7, the plant doesn't have that luxury. If the turbines aren't running, there is no data to collect. It's that simple. It also means that a successful preventive maintenance program is difficult to sustain.

As a result, when the turbines are up and running, the plant's operators must collect as much data as possible in a relatively short timeframe. Not knowing when their next opportunity may be to collect information, they must make sure that the data is thorough, accurate and analyzed quickly in order to detect any readings outside the norm and establish a plan for repairs.

At the outset of the program, Commonwealth Chesapeake selected Azima DLI's DCX for its operators to handle data collection and analysis. The Azima DLI DCX is a four-channel, Windows-compatible portable vibration data collector with embedded data acquisition hardware and automated diagnostic software.

The DCX embeds Azima DLI's ExpertALERT vibration analysis system software, so at the point of data collection, users have all of their machinery history, analysis tools and automated diagnostic results available. This immediate access to important machine data allows Commonwealth Chesapeake to easily share data, get a second opinion if necessary, and rapidly identify a plan of action.

An effective vibration monitoring program that includes access to detailed analysis and reports to back it up, allows Commonwealth Chesapeake to demonstrate that it is taking the appropriate steps to achieve machine reliability. While not required by law, yet, focusing on machine reliability is a good business practice for plants like Commonwealth Chesapeake as they strive to adhere to established guidelines set forth by the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corp. (NERC).

Like many U.S.-based power plants,

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Commonwealth Chesapeake undergoes regular audits by NERC where it must demonstrate it has effective processes and technologies in place to ensure machine reliability. For example, the plant must be able to prove that all the safeties are working on the turbines, otherwise the plant could risk taking down the whole power grid.

If a plant fails an audit, it must set up a mitigation plan and is at risk of being fined up to US$1 million a day per violation. Therefore, Commonwealth Chesapeake places a high priority on the success of its machine condition monitoring programs. The company's relationship with Azima DLI has helped the plant adhere to industry guidelines. Azima DLI has also assisted with establishing best practices for machine reliability and uptime when it's required.

When Commonwealth Chesapeake is called on for power, the operators must be confident that the plant can deliver. The ability to see in advance that a piece of equipment is not performing is a significant benefit. With the sporadic operation of the turbines, not only is collecting vibration data a challenge, but it can pose a risk for equipment failure as well. Consider this automotive analogy — if a car was kept in storage for long periods of time, one could not expect to take it out on the road for one day and expect there not to be any knocking or stiffness in the way it handles.

Translate this analogy to Commonwealth Chesapeake's six duplex 2500 ton chillers. This equipment is responsible for cooling the air that goes into the turbines. These chillers are especially important during summer months, peak season for electrical use.

To ensure the chillers are in peak condition, operators collect data at the beginning of the summer usage cycle and then again at the end of the season. After analyzing this "before" and "after" data, operators can identify potential failures and set up a repair and maintenance schedule over the fall and winter months while they are not in use. In one particular case, this pattern of seasonal data collection avoided a major failure with one of the chillers.

One of the plant operators recently collected data at the end of the summer, ran it through the Azima DLI ExpertALERT diagnostic software and received an indication for a major repair. Commonwealth Chesapeake operators wanted a second opinion before scheduling the work. Using the Azima DLI system, they were able to share data with the PdM Solutions team, who confirmed the diagnosis and the plant was then able to prioritize the repair.

Considering the impact of a downed peaking plant — that in an emergency could leave hospitals, prisons and other essential community infrastructure in peril — there is a lot at stake. With the success of its vibration monitoring program that can be measured in terms of equipment reliability, plant performance and failure avoidance, Commonwealth Chesapeake is confident that it can meet the power needs of its community without fail.

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