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Leonard Bernard,
Operations and
Maintenance Project
Manager, NORESO

AT A GLANCE:

SITUATION

- NORESO
- U.S. Government
- Multiple U.S. Navy Bases
- Leonard Bernard, Operations and Maintenance Project Manager

CHALLENGE

Inspect 20 miles of high pressure steam lines

SOLUTION

Comparing the upstream and downstream readings gives a quick indication of whether the trap is functioning correctly.

TOOLS USED

- Fluke 561 Infrared Thermometer
- Fluke Ti20 Thermal Imager

RESULTS

- Verify operation quickly and efficiently

FLUKE®

Infrared testing keeps the U.S. Navy under full steam

Case Study

Energy Waste

From the Smithsonian Institution to the National Museum of Natural History, Leonard Bernard's job takes him to places high on any tourist's itinerary.

While the tourists kick back, Bernard is working to save energy at federal government facilities, from the great museums of Washington, D.C. to naval stations. As operations and maintenance project manager for energy service company NORESO, Bernard is part of a team of 25 HVAC techs devoted to squeezing energy consumption and cost from the operations of 20 buildings and bases.

For NORESO and Bernard, it's all about energy: helping customers understand where their energy is going, and maintaining, operating and upgrading facilities to ensure that less energy goes to waste. Under the Energy Policy Act of 1992, federal facilities are mandated to reduce energy usage by at least 35 percent from 1985 levels. Recent concerns about high energy prices—the cost of steam has tripled in two years, according to Bernard—and global warming have underscored the value of energy savings.

Government agencies have signed Energy Savings Performance Contracts with NORESO to achieve energy savings while simultaneously upgrading their energy infrastructure. Money saved through careful system management and maintenance

is used to upgrade the energy infrastructure. Those improved, more efficient systems then deliver long term energy savings.

Because he has 20 complex facilities to cover, saving time is almost as important for Bernard as saving energy. At the naval station, for instance, some 20 miles of high pressure steam lines deliver energy from gas-fired steam generation facilities to ships and buildings. Routed through tunnels and below docks or hung overhead, those steam lines must be inspected four times each year. But Bernard has a secret weapon.

All steamed up

Steam made the industrial age possible, but steam is no antique. Steam drives the turbines in electrical generation plants powered by nuclear and fossil fuels. Steam heats buildings and serves in countless industrial processes. And when the Navy's Nimitz-class nuclear carriers charge into the wind at 30 knots to launch their aircraft, the turbines that drive their propellers with 260,000 horsepower are powered by steam.

When they return to port and tie up at the docks at the naval station, the big carriers and many smaller ships still need steam to run their mechanical systems. Rather than generate that steam onboard, they rely on shore systems to deliver



steam at a minimum of 150 psi at the valve where the ships hook up, according to Bernard. Maintenance for those 20 miles of steam distribution lines must take into account the unique characteristics of steam.

Steam moves energy through as both heat and pressure. For saturated steam, the relationship between pressure and temperature is exact: you can look it up using a steam pressure-temperature table. At sea level (atmospheric pressure 14.696 psi, or zero psig), water boils at 100 °C (212 °F). (Because virtually all pressure gauges are calibrated to zero at sea level, the measure psig—pounds per square inch gauge—is used for pressures above sea level.) Steam at 150 psig will have a temperature of 185.5 °C (365.9 °F). Higher pressures = higher temperatures.

It's a great way to move energy, but steam has its peculiarities. Its high temperature and pressure pose a significant safety hazard. And, because chemical reactions such as corrosion accelerate as temperatures rise, system monitoring and

maintenance are continuing chores. The lines and pumps at Naval Station Norfolk are built with high tensile stainless steel to minimize problems, but inspection is essential. Not easy, however, especially when steam lines are located in tunnels that require a special confined space permit to enter. The hundreds of steam traps that remove water from the steam lines are a particular maintenance issue, and that's where Bernard's Fluke 561 multipurpose infrared thermometer comes in.

Working 'quickly and efficiently'

When working properly, steam traps produce a slight drop in steam pressure and temperature downstream of the trap. Bernard reads the temperatures from a distance with his Fluke 561—no need to get up close with a contact probe. Comparing the upstream and downstream readings gives Bernard a quick indication of whether the trap is functioning correctly. If there's no temperature drop, he schedules the trap for maintenance.

"It's ideal for inspecting steam traps that are located in tunnels or under piers," Bernard said. "Before having the 561, you would need a confined space permit, climb into the tunnel (making sure the tide was out) and inspect the trap and steam system. Now I can get to the side of the pier and using the laser sighting, pinpoint the trap or steam component and verify operation quickly and efficiently."

The Fluke 561 saves more time when Bernard checks the function of HVAC chiller units. "We know what the operating parameters are," he said. "If a chiller should be producing 44 °F water, we can instantly read what it is actually doing." He also uses the Fluke 561 and the Fluke Ti20 Thermal Imager to check electric panels for hot spots that could indicate a high-resistance connection that requires attention.

"Infrared is a very vital part of our tool kit," Bernard said. There is just one minor issue for Bernard's secret weapon.

"The only thing is that the holster looks like a pistol holster," he laughed. "On military bases, the guards always want to verify what I have. I take it out and have it in plain sight approaching a secure location. Keeps my job interesting."

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Printed in U.S.A. 2/2013 4315910A_EN

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