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Best Practices – Newington

Continuous-blowdown block valve reduces startup time, plus…

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Challenge. At Essential Power LLC's Newington Energy Facility, the high-pressure (HP) steam-drum continuous blowdown system was designed to cascade flow to the intermediate-pressure (IP) steam drum. The facility originally was equipped with an automatic globe-style control valve for HP blowdown.

While the valve worked well for controlling flow, it did not have the degree of leak-tightness required for stopping flow from the drum during typical overnight shutdowns. Blowdown service is a challenging application because the valve can experience flashing with a differential pressure of up to 1550 psi. Note that the plant, which began commercial operation in 2002, was designed to operate base load and did so until 2008. Since then the facility has cycled, averaging about 230 starts annually.

After several repairs to the valve trim, plant personnel decided to abandon the original globe valve and they worked closely with a manufacturer to identify a replacement capable of providing the desired flow control while also assuring tight shutoff for overnight periods. The replacement selected was an angle valve with both improved trim suitable for flashing service and Class V shutoff. The angle valves were installed on the HP blowdown lines for both HRSGs in 2010. They worked well for about six months. Then the valve trim again required repair because of excessive leakage from the HP to IP drums during overnight shutdowns.

The excessive leakage caused several problems, including these:

- Loss of water level and pressure decay in the HP drums overnight.

• Increase in water level and high pressure in the IP drums, requiring operators to blow down those drums frequently.

• Depending on the duration of the overnight shutdown period, a so-called "450 hold"—identified as a 30-min HRSG OEM-required, HP-drum heat soak at 450 psig—could be required during boiler restart before the gas turbine was ramped up to operating conditions.

• Addition of cold feedwater to the HP drum to bring its level back within the operating range prior to GT startup.

• Increased consumption of demineralized water, requiring more frequent regenerations of demin trains.

Newington Energy LLC

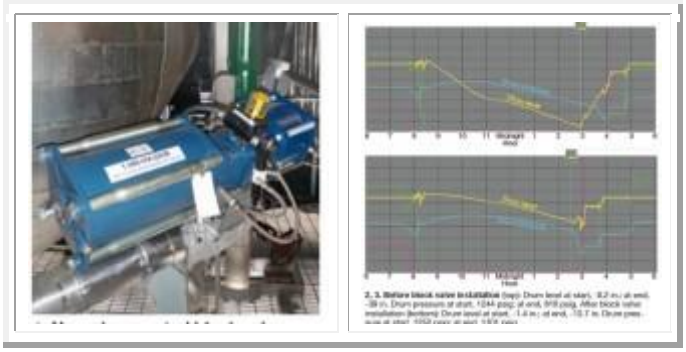
Essential Power LLC

525-MW, dual-fuel, 2 x 1 combined cycle located in Newington, NH

Plant manager: Thomas Fallon

Solution. Research by plant personnel indicated that manual isolation valves were not a viable solution for a plant cycling daily. They worked with the supplier of the replacement angle control valve to investigate if other trim materials or valve types could be used to reduce or eliminate the blowdown leakage. An automatic replacement blowdown-valve solution could not be identified.

Thus plant personnel decided to install an automatic full-port ball valve upstream from the existing automatic control valve to eliminate the risk of flashing. A 2-in., 2250-psig, air-actuated and metal-seated bidirectional ball valve from ValvTechnologies Inc was selected for this service (Fig 1). The ball valve is equipped with a Morin fail-closed, spring-return actuator and position limit switches.



The new valves were installed near the HP drum on each HRSG during a recent outage and have been in service for several months. The open/closed block valves are

controlled automatically from the DCS. Limit-switch feedback to the control room provides assurance of proper opening and closing of the block valve.

Results. The new block valves showed immediate results. During the first overnight shutdown period following commissioning of the valves, the decrease in HP drum level was significantly less and did not require addition of water to satisfy the GT start permissive the following morning (Figs 2, 3). Additionally, operators did not have to blow down the IP drum during the overnight period and a "450 hold" was not required during the morning start.

Additional longer-term benefits include these:

- Reduced both makeup (city water) requirements and the consumption of demin regeneration chemicals (sulfuric acid and caustic soda).
- Improved drum chemistry, because large swings in drum level have been eliminated. Consumption of chemicals for boiler water treatment also has been reduced.
- HP-drum thermal stresses have been reduced by eliminating the addition of large quantities of cold water after an overnight shutdown.
- Decreased start-up times by avoiding costly "450 holds."
- Avoided maintenance costs that would have occurred from using the blowdown valve to shut off flow had the block valve not been installed.

Project participants:

Chad Harrison, maintenance manager; Ted Karabinas, maintenance technician; and Scott Courtois, I&C technician.