

PROFESSIONAL REVIEW

Utility manager: Fluke SF6 Gas Leak Detector saves us hours in inspection time

Name: Steve Larson, Manager of Substation Construction and Maintenance

Company: Snohomish County, PUD

Tools: Fluke Ti450 SF6 Gas Leak Detector

The Snohomish County Public Utilities District serves more than 340,000 customers with electricity in Washington state. It's a sprawling area of more than 2,200 square miles north of Seattle.

This municipal corporation, the largest public utility district in the state, delivers about 8.5 million megawatt hours of energy annually, and maintains more than 6,000 miles of power lines and 94 substations.

Steve Larson is the Manager of Substation Construction and Maintenance at Snohomish County PUD. His team recently began deploying the Fluke Ti450 SF6 Gas Leak Detector in the field to inspect live high voltage equipment at those substations, primarily circuit breakers.

The combination gas detector and thermal imager has helped transform inspection and repair of leaking circuit breakers. A cumbersome manual process that required taking equipment out of service before a leak could be found and repaired,

is now one that can be completed while equipment is in operation and repairs planned. That saved the PUD time and money.

“Circuit breakers are absolutely critical devices in the system,” Larson says. “They open up when you have faults. The transmission voltage in most Snohomish County substations is 115,000 volts and the circuit breakers would have to interrupt currents of up to 40,000 amps. Breakers are a safety measure. If a tree falls on one of the high voltage lines, a circuit breaker would open up to prevent damage and prevent people from electrocution or fire.”

Protecting the inner workings of approximately 250 circuit breakers and switches within their system is SF₆ gas, or sulfur hexafluoride. It is sealed inside the equipment enclosure to interrupt potential arcs and as an insulator.



“With the camera, you can see things leaking before there is a pressure loss,”

"SF₆ gas is considered the best product for enclosed high voltage circuit breakers and switches as an interrupting and insulating medium," says Larson. "It's a very good arc-quenching gas and can withstand high electric fields."

Gas has global warming potential

Even though it is the most efficient insulator for this purpose, SF₆ is classified as a greenhouse gas so measures must be taken to minimize any and all leaks from equipment. "It's a high GWP (global warming potential) gas," Larson says. "While mainly contained and not released or burned, it has GWP potential many times that of CO₂." It is also expensive, running about \$15 per pound.

High voltage circuit breakers and transformer are filled with a small charge of SF₆ to maintain pressure during delivery. Once delivered, the equipment is filled to the normal pressure of approximately 90 PSI at the substation when installed. A gauge on the equipment indicates pressure, which is checked monthly.

"If the pressure drops about 15 % from nominal, then an alarm is sent to alert us to the pressure drop. We then go out and inspect, add more SF₆ gas, and schedule a repair. If the pressure drops more than about 25 %, the equipment is prevented from operating."

In the past if a pressure loss was detected, the equipment was taken out of service and a "snoop" or "sniffer" was used to manually find the leak. That meant holding the device in your hand and moving it around the equipment until an audible indicator showed a presence of a leak.

"It was more cumbersome than the Fluke camera and required an outage to take the equipment offline."

Inspect without de-energizing

That's where the Ti450 SF₆ gas detector comes in. The detector, especially designed for the utilities industry, can detect SF₆ gas in the field without having to de-energize the equipment.

"With the camera, you can detect leaking and know the cause before the pressure loss becomes significant," Larson said.

Larson points to one recent occurrence that illustrates the point. He had a circuit breaker that was experiencing some pressure loss. A team was deployed with the SF₆ Gas Detector in hand.

Using the detector, they carefully inspected the breaker from a safe distance at several different angles, taking video and capturing it for review.

"We were able to find out that the leak was coming from the aluminum casing," he said. "An outage was arranged and we were able to complete repairs. By knowing where the leak was, we were prepared with the right materials and equipment ahead of time. Most importantly we were able to plan the downtime."

He estimated on the one incident alone, the PUD saved at least two to three hours of time and more than \$1,000 of saving from the old way of detecting leaks.

In addition, the Fluke SF₆ Gas Detector is a fully capable thermal imager that can be used to identify conductive path issues, connections or switch problems in the station.

"We're always looking at the connections in the bus work, and at cable terminations," Larson says.

