



# SPECTRONICS CORPORATION

956 Brush Hollow Road, P.O. Box 483  
Westbury, New York 11590

Tel: 800-274-8888 • Fax: 800-491-6868  
Outside U.S. and Canada

Tel: 516-333-4840 • Fax: 516-333-4859

www.spectroline.com

## CASE STUDY

# #101

### FLUORESCENT DYE SLASHES INSPECTION TIME AT OKLAHOMA POWER PLANT

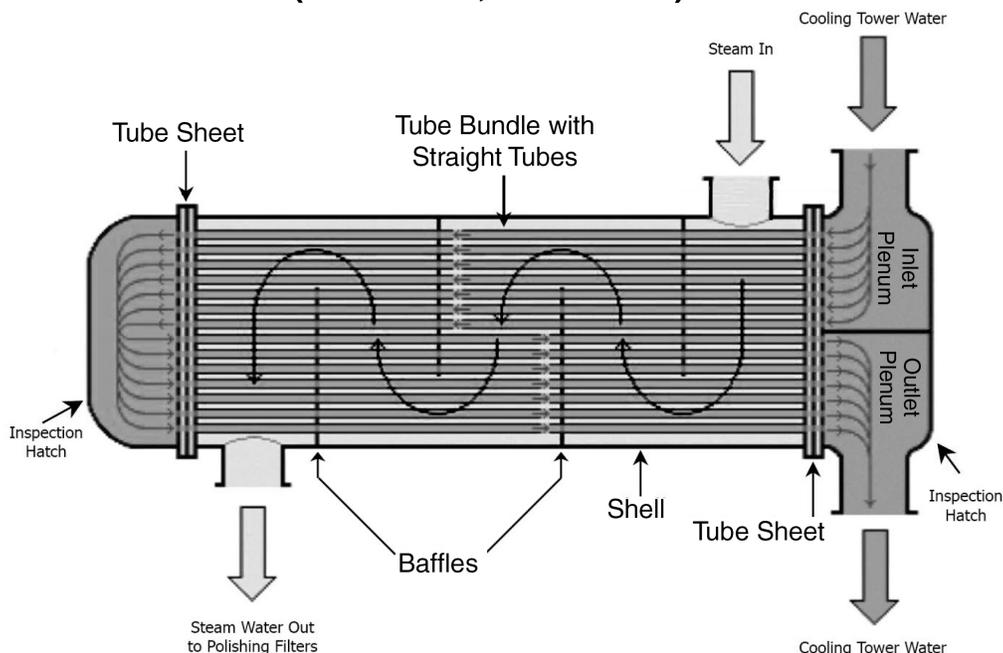
Closing an active power plant to perform complete inspection and maintenance of facility equipment is challenging and time-consuming —especially when the process can take up to two days and requires up to five technicians to complete. A safe, cost-effective, hassle-free and reliable leak detection method can speed up inspection and get the system running again quicker and more efficiently.

As a case in point, Western Farmers Electric Cooperative (W FEC), a power system plant in Hugo, Oklahoma serving the community since 1982, shuts down its operation periodically to perform inspection and repair of all the equipment in the facility. With additional plants in Mooreland and Anadarko, Oklahoma, W FEC is a generation and transmission cooperative that provides essential services to 22 member-owned cooperatives, as well as Altus Air Force Base and other power users. It is Oklahoma's largest locally owned power supply system, serving the electrical needs of more than two-thirds of the state.

#### Leak Checking a Condenser Unit: A Tedious Process

One of the procedures performed at W FEC is a leak check of the coil tubes in a condenser unit. According to Tom Pike, plant chemist at the facility, maintenance technicians fill the main circulating condenser with water until the top condenser tubes are covered. The unit is about 40' x 30' x 20' with approximately 20,000 tubes (see illustration below). It changes incoming steam, from a low-pressure turbine, back into water. The water is then filtered and reused, a term referred to as "polishing."

#### Typical Straight-Tube Heat Exchanger (Two-Pass, Tube-Side)



While the tubes are filling up and being plugged by two contractors, two or three maintenance workers go inside the circulating water-side of the condenser and blow air through all 20,000 tubes to remove any standing water. Then for several hours, they go back inside with lights and search for any droplets of water dripping from the tubes, where they are welded to the tube sheet.

It is a long, time-consuming process that takes about a day and a half to complete. "One of the problems with this method," says Pike, "is that the guys can't quickly spot leaks unless they are significant. Nor can they determine if a leak is coming from inside the tube or around the outside of the tube, indicating a loose tube penetration through the tube sheet." In addition, continuously high levels of contamination in the steam water have been found in the past, even after repairs have been completed. Thinking that this may have been due to leaking coils that were missed, Pike looked into alternative ways to inspect the tubes. He came upon Spectroline® WATER-GLO™ 802 fluorescent water dye.

## Simple, Yet Effective

WFEC maintenance workers started off the process by filling the condenser box with the fluorescent dye and water. As the water was added, they immediately found leaks in the lower tubes due to their bright green glow. The fluorescence in the dye greatly sped up the process, which saved a lot of time. All leaking tubes were plugged, and the leaks in the tube sheet were fixed during the inspection process.

After plugging all the leaking tubes, the system was put back online and the polished water was tested for contaminants. Results revealed an impressive *decrease* in main steam **Na** (sodium) and **SiO<sub>2</sub>** (silicon dioxide). Levels were now at "**VERY**" acceptable levels. Two months after the initial use of WATER-GLO™ 802, the contamination levels are still in the "acceptable" range. Pike is so impressed that he will be using the dye for all future inspections.

When queried about his initial expectations of WATER-GLO™ 802, Pike stated, "I expected, if we were able to determine the correct dye to water concentration, to reduce the labor by at least 50%. Also, I was hoping to quickly locate and correct all large tube leaks and possibly some of the smaller leaks as well." His expectations were exceeded. *It took only six to eight hours to find the leaks with the first use of the water dye, instead of the planned one to two days.* Pike is now looking into ways to shorten that time even further.

## How It Works

WATER-GLO™ 802 is a fluorescent water dye that reveals *all* leaks in static and circulating water systems, boilers, storage tanks and other high-volume containers. It can also locate leaks in piping, valves, condensers, sprinkler system pumps, seams, welds and fittings.

Simply add a small amount of the dye into a system and allow it to circulate. Wherever the water escapes, so does the dye, which remains at the sites of *all* leaks. When the system is scanned with a high-intensity Spectroline® leak detection lamp, the dye glows a bright green to pinpoint the *exact* location of *each* and *every* leak.

## Epilogue

Tom Pike has had so much success with WATER-GLO™ 802 that he has now started using Spectroline® OIL-GLO™ 44 fluorescent oil dye to find leaks in WFEC's hydraulic, gear box and lube oil systems. "All power plants should use this simple technology to find leaks quickly," says Pike. "The savings is tremendous."

Spectronics Corporation invented fluorescent leak detection in 1955 and remains the world's leading manufacturer of fluorescent dyes and inspection lamps. The company's goal is the same as when it was founded nearly sixty years ago—to produce effective, top-quality, cutting-edge products with the utmost dedication to customer satisfaction.