

Improved Plutonium Processing at Savannah River National Laboratory



Replacing an aging colorimeter process monitoring system with a cutting edge spectroscopy system featuring [Avantes spectrometers](#) offers promising benefits for the [HB Line Chemical Processing Facility](#) at the [Savannah River Site \(SRS\)](#), part of the surplus plutonium disposition mission. The new system developed in partnership with [Department of Energy Office of Environmental Management](#), employs commercially available spectrometers and is proving to be easier to troubleshoot, repair, and calibrate than the old system. It also improves efficiency and safety for SRS employees, staff, and the environment.



The Savannah River Complex

Commissioned in 1951, in the early years of the Cold War, the Savannah River site was initially built to produce nuclear material, primarily Plutonium-239, for use in weapons programs. The Savannah River Complex consists of several reactors as well as support facilities including chemical separation plants and waste management facilities.

Situated at the head of [H Canyon](#), the [HB Line facility](#) is the hardened nuclear chemical separations plant for recovering nuclear material and producing material to

fuel the nation's deep space exploration program.

HB Line Process Monitoring

The HP Line historically employed colorimeters to detect plutonium concentrations in solutions. The darker the color of solutions, generally the higher concentration of plutonium. These instruments required downtime to troubleshoot and repair, and required annual off-site calibration. The colorimeter instruments also lacked accuracy requiring the team to keep concentrations low to be certain they stayed within safety margins.

Next Generation Spectrophotometer

The new process control system is called the Next Generation Spectrophotometer (NGS). Housed in a rack mount cabinet in the HB Line operations control room, the NGS system is actually comprised of several paired dual-channel spectrometers, roughly 10 pairs in all. Because the spectrophotometer system can detect a broader range of colors, the measurements are more accurate. The rack mount design is also easier to maintain and it's scalable, allowing expansion of the system without the need for hardware or software modification. Employees can calibrate the system within minutes without dismantling the system reducing downtime, and the user-friendly interface



alerts operators of alarm conditions. Because of the increased accuracy of measurements, plutonium concentrations can average closer to the limits without fear of exceeding them due to inaccurate measurements.

Leading Edge Spectrometers

The dual channel spectrometer pairs of the NGS at the Savannah River HB Line are based on the [Avantes AvaSpec-ULS3648](#). This instrument offers exceptional UV response covering 200-1100nm and sensitive to 160,000 counts/ μ W per ms integration time.

The improvements to accuracy and maintenance time are dramatic for this section of the Savannah River site and there is potential for this system to be implemented in other areas of the Department of Energy.

To learn more about working with Avantes to design the measurement and control process that meets your unique project requirements, contact a sales engineer today.



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