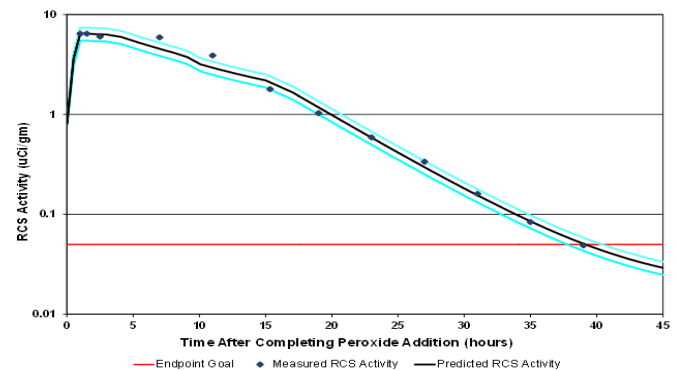


Value Delivered

- ✓ Reduced outage costs
- ✓ Improved performance
- ✓ Reduced operator burden & limited control room distractions
- ✓ Dependable contingencies in place, including management of fuel failure effects, if required
- ✓ Maximized certainty with consistent scheduled outage chemistry elements

Industry Challenge

Outage critical path time can cost utilities over \$1,000 per minute, so success in shutdown and startup schedule duration and execution is vital, but not simple. It requires optimized schedule content, updated procedures, trained and knowledgeable staff, equipment readiness, prepared and staged chemicals, developed and applied predictive tools, and an optimized sequence to reduce operator burden.



ChemStaff Solution

The experts at ChemStaff can meet this challenge. Our seasoned professionals are highly trained and thoroughly knowledgeable, trusted to develop shutdown and startup chemistry programs that work on time every time. ChemStaff specialists even worked on the team that designed and effectively executed the chemistry program for a 14-day PWR refueling outage. We have optimized and managed shutdown and startup chemistry programs successfully for well over 100 refueling and mid-cycle outages, so we understand the requirements and work diligently with plant personnel to achieve those requirements safely and efficiently. We deliver the following:

- ✓ Predictive tools – Advanced modeling for cobalt peaks, post-peroxide cleanup duration, and dose prediction tools provide industry-best estimates for planning outage durations.
- ✓ Outage schedule – Necessary chemistry program elements are incorporated into outage schedules and optimized to minimize operator burden and ensure timely and effective execution.
- ✓ Procedures – All outage-related chemistry program elements are reflected in the schedule and procedures.
- ✓ Training & preparation – Appropriate chemistry and operations personnel receive training for shutdown and startup program elements.
- ✓ Execution – On-site support is provided during shutdown and startup to assist plant personnel, and to develop recommendations for continued improvement.

