THE *NUCLEAR NEWS* INTERVIEW

Kelly Alderman: Exceeding expectations in outage performance

Callaway's outage manager led a successful refueling outage in 2014 and is looking to maintain that momentum going forward.

Photo: Ameren Missouri

Alderman: "This was a breakthrough performance for the Callaway team."

Kelly Alderman has more than 28 years of experience in nuclear power plant operations, maintenance, work management, and engineering. He began his nuclear career with eight years of service as a reactor operator in the Navy submarine force, and for the past 15 years he has worked at Ameren Missouri's Callaway Energy Center. In addition to his current role as Callaway's outage manager, a position he has held since 2012, Alderman continues to serve in the Navy Reserve and is the commanding officer of a Naval Sea Systems Command engineering unit. He holds a bachelor's degree in electrical engineering from Southern Illinois University and a professional engineer license, and he is a previously licensed senior reactor operator.

On March 6, Alderman spoke with *NN* Associate Editor Michael McQueen about the Callaway Energy Center's most recent outage (also see page 34).

How many outages have you managed at Callaway?

Our fall 2014 refueling outage was my second as outage manager.

What was the purpose of the outage, and what was its duration?

The Callaway Energy Center refuels every 18 months. This was a scheduled refueling outage for us—our 20th. It began on October 11, 2014, and was completed in 42 days, 11 hours, and 37 minutes. We returned to power production when we synchronized to the grid at 13:11 on November 22, 2014.

How many workers were involved?

There were about 1,200 contractor employees on-site, and Callaway has around 800 full-time employees.

Who were the major vendors involved in the outage?

Callaway's primary contractor for maintenance and modification is BHI Energy. Areva was the contractor for the reactor vessel closure head replacement. The teamwork among our contractors was instrumental in our success. We could not have done it without them. For example, the scaffold and containment hatch logistics could have derailed the entire project. Areva and BHI worked together to ensure that the entire team was successful from a big-picture point of view. They coordinated to the point where handoffs of resources between the two primary contractors was a nonissue. The subcontractors also played a big part in our success. Corrigan Mechanical and Schneider Electric executed their work with precision and always maintained a customer focus. They, too, had several jobs to carry out for different prime contractors during the outage. But they all had one goal in mind and always focused on ensuring that Callaway was successful in the execution of the outage.

You're using the word "success." I take it, then, that the outage met your goals?

In nuclear power, we are trained to never be satisfied with our performance. But we met our goals for Refuel 20. This was the first time in Callaway's history that we met our outage site execution duration goal. It was a stretch goal for us, set at 43 days. Our business plan goal was 47 days, which we exceeded as well.

What was the scope of the outage?

Our major scope included a first-time

reactor vessel closure head replacement project—a large capital project for the company that was five years in the making. It was done for long-term equipment reliability. The outage scope also included a 15-year integrated leak-rate test of our containment structure. In addition, we overhauled one of our low-pressure turbines. We completed approximately 12,000 activities, including surveillances and preventive, corrective, and deficient maintenance, as well as modifications to improve station reliability.

How long did the head replacement project take?

It was integrated into the schedule, so it ran pretty much at the same time the outage ran. It was a large part of our critical path.

Other than the outage's duration, what were the major successes for you?

Most important, the outage was performed safely. We had zero OSHA [Occupational Safety and Health Administration] recordable incidents. Our personnel also worked ALARA [as low as reasonably achievable], and as a result, we finished the outage under our "excellent" radiation dose goal, also a stretch goal. We completed the outage with an actual dose of 39,240 person-millirems, compared to the excellent dose goal of 48,100 person-millirems. This was also a site historical best performance.

What were the major challenges?

In addition to the challenge of project scope growth—meaning additional outage projects—there were some significant emergent issues that challenged the achievement of our outage goals, including a containment hatch crane malfunction, a hydrogen leak on the main generator during startup, and extensive essential service water piping replacement beyond the original plans. Overall though, emergent-issue response was significantly better than previous outages. This was due in large part to changes made following benchmarking performed during a Callaway continuous improvement project to improve outage performance. We made changes to our emergent-issue response that better aligned our outage process with our on-line process. This resulted in better ownership of issues and, ultimately, quicker resolution.

Was there any major aspect of the outage that fell short of your expectations?

We were not as ready for some outage windows as we could have been. The plant startup phases could have been more efficient. However, we finished safely, on time, and on budget. Again, it was our lowest outage dose ever for a plant—39 person-rem. We did experience some delays in our schedule, and those can certainly be improved upon. Callaway is a learning organization. We're going to analyze the delays we had, especially in our plant startup. We had delays that could have been avoided, and we'll learn from that and improve our performance going forward. But from an industrial safety perspective and a dose perspective, we exceeded expectations.

How would you characterize this outage in relation to the previous one, your first?

This was a breakthrough performance for the Callaway team. We had a poor outage in Refuel 19. We performed a formal cause analysis to identify organizational and programmatic issues that were preventing the site from achieving breakthrough performance. One key action taken from that was to create a more challenging environment for outage leadership and the outage leadership team. We established weekly "challenge" meetings for our senior directors and vice presidents to challenge me and the outage leadership team—including our operations director, maintenance director, engineering directors, work management director, and the business planning director—on various aspects of outage readiness. This engagement at the site leadership level was the greatest driver of vertical site engagement in preparing for refueling outage 20.

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Were there other benefits of the analysis?

The formal cause analysis also examined what occurred, what could have been done better, and what changes would need to be made, with a strong focus on organizational and programmatic changes. We also made significant organizational changes to add personnel to the outage department to focus line department actions on outage preparation activities. The maintenance, operations, and work management directors added line organization representatives to the outage organization at the shop coordinator level. The new positions are responsible for their discipline's ownership, from preparation through the execution phases of an outage. The dedicated shop coordinators drive the preparation phase and transition into department coordination center leaders during outage execution, ensuring knowledge of activities throughout the different phases of outage performance. Within six months of the outage start, we held additional alignment meetings with the department managers to increase engagement at the department head level.

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The outage scheduling supervisor also delivered an educational campaign to raise overall knowledge of the refuel outage activities by creating an outage website learning library and performing traveling road shows. The website learning library included such items as planned scope and basis, risk management, contingency plans, and challenge meeting notes. The road shows provided outage information at regular intervals to multiple levels and departments throughout the organization.

During execution, the outage organization worked cross-functionally with maintenance and projects personnel to monitor and control bulk work to enable shift outage managers to look ahead in the schedule and manage schedule gains and losses. This empowered the Outage Control Center [OCC] to better manage schedule contingency to ensure outage duration goals were met.

We also did a lot of benchmarking of industry top performers in outages, especially consistent top performers. I wouldn't call us a consistent top performer yet. We have a lot to learn and will continue to do so. One of the best examples of what we learned from benchmarking was to staff the OCC with individuals who are more proficient with driving work execution because of their on-line roles and responsibilities. For instance, we utilized on-line work week managers as the maintenance outage managers in the OCC, where we historically would have had maintenance managers and the maintenance director staff that position. This also provided an opportunity for the maintenance director and managers to provide more tactical field and shop oversight

of their departments, as well as the supplemental workforce.

When do you start the planning for the next outage?

There is some overlap on every outage. Preparation actually starts 24 months from the next outage. And, because we operate on an 18-month fuel cycle, we were already in the initial preparation stages for Refuel 21 while still finishing up preparations for Refuel 20. We've been on line for about 100 days now. We are nearing scope freeze for Refuel 21. By July, we will establish the milestones for refueling outage 22, which will be executed in the fall of 2017.

Will there be any major projects similar to the head replacement for the next outage?

No, there are no major projects scoped for Refuel 21. The scope will include several equipment reliability–driven modifications and some modifications to support our beyond-design-basis accident requirements—Fukushima modifications. We have replaced our steam generators, condenser, main turbine, and reactor vessel head. All of our main transformers were replaced in Refuel 19. We've aggressively executed numerous major system upgrades since Refuel 13, working our strategic long-range plan to make Callaway ready for the next 30 years of operations. In fact, just today, the Nuclear Regulatory Commission announced its approval of an additional 20-year license, extending Callaway's operating license to 2044 (see page 24). We performed many equipment reliability improvements in the outage to help ensure the success of our license renewal project.

Outages are certainly starting to become key to nuclear sites because, truthfully, most of us are running the same and operating the same. The key business opportunity is how well you execute outages. Our corporate and site leadership has never driven us to have shorter outages. The focus has been to execute the outage in the duration that was committed to. Based on our corporate and site strategic infrastructure, our long-range outage plan is aligned around consistent durations. A typical outage for us is going to be 30 to 40 days, depending on the workload, just because of the economics and the maintenance that has to be performed.

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From a risk perspective, we are starting to do less maintenance on line and are moving toward performing more maintenance during refueling outages. However, we cannot have extremely long outages either. We want to have the most efficient, most predictable outage. If we plan and prepare for a 40-day outage, then we need to complete the correct scope, with the correct number of people, to meet the budget and the committed duration. Our mission is to ensure continuous and safe operation of the plant while completing a breaker-to-breaker cycle until the next refueling outage. NN