

THE NUCLEAR NEWS INTERVIEW

# Surry senior management on preparing for outage excellence

*Larry Lane, Mike Haduck, and Roy Simmons discuss the planning that went into the 2015 Surry-2 outage and the major projects completed.*

Larry Lane has been the site vice president at Dominion Generation's two-unit Surry Power Station for the past five years, having spent the previous 30 at the utility's North Anna plant, where he started as an auxiliary operator and ultimately became site vice president. Mike Haduck, a 38-year Dominion veteran, has served in a variety of coordinator and supervisor positions in maintenance and planning at Surry, and in January of last year he was named the plant's outage and planning manager. Roy Simmons—the nuclear neophyte of the group, with a mere 25 years of Dominion experience—has worked in a number of different departments at Surry, including radiation protection, operations, maintenance, and training, and is currently the plant manager.

On March 9, Lane, Haduck, and Simmons spoke with *NN* Associate Editor Michael McQueen regarding the major projects completed during Surry's most recent refueling outage and what it takes to achieve superior outage performance. (Photos: Dominion Virginia Power)

*Surry's most recent outage was conducted in the fall of last year, correct?*

**Lane:** Yes, on Unit 2. Most U.S. plants work on an 18-month refueling outage schedule. During these outages, about one-third of the reactor fuel is replaced. Some sites, probably less than a half-dozen or so, are on a 24-month cycle. Even fewer than that have gone to 12-month cycles; those are mainly merchant plants that are in competitive commodity markets. The long-standing rule is that about every 18 months, you shut down for a refueling and maintenance outage. While you're down for that time, you basically do major overhauls to refurbish equipment. Pumps and motors are replaced and overhauled, valves are repacked. This ensures good reliability when you come back online.

*What was the duration of this outage?*

**Haduck:** The outage began on October 19, 2015, and ended on December 11. For



Lane



Haduck



Simmons

a little background, in late 2014, we received a notice from one of our suppliers—Westinghouse—regarding problems with the style of reactor cooling pump turning vane bolts used in our plant. When a manufacturer notifies us about something with which they have a concern, Surry takes a proactive approach to address that concern. The fall 2015 outage was planned around that. It required the removal, repair, and reinstallation of all three reactor coolant pumps in Unit 2.

**Lane:** I think it's noteworthy that if you look across the industry, the removal, repair, and reinstallation of all three coolant pumps is a Herculean feat. When you speak with our colleagues in the industry, most have done only one at a time. They're much easier to deal with one at a time than in multiples.

*Why is that?*

**Lane:** Because of the congestion that it creates on your operating deck. You only have one hatch—one door—to move your equipment in and out of containment. It gets quite congested, with a great deal of large material going in and out.

*These pumps are large components?*

**Haduck:** Just to give you some perspective, a reactor coolant pump is approximately 12 feet tall and 8 feet wide and weighs somewhere in the neighborhood of 20 tons.

*How long did the coolant pump project take?*

**Haduck:** The duration of coolant pump replacement itself was about 24 days for all three.

*What is the average length of a refueling outage?*

**Lane:** Generally, these outages average a total of 34 or 35 days. That's what the industry average is. Some plants do it much more aggressively. They're in the low 20s. The Dominion average is generally in the high 20s. For our spring 2015 Unit 1 outage, we allowed for 41 days, but we were actually able to do it in 38 days, which was tremendous. On Unit 2, we were scheduled for 45 days and would actually have been able to do it in 44, except for a complication. We had an unanticipated shutdown of Unit 1 right before the Unit 2 outage started, so the actual duration of the Unit 2 outage was 53 days and 12 hours because we borrowed parts from Unit 2 to get Unit 1 back on line quickly. The lead time for the items that had broken on Unit 1 was unusually long.

**Haduck:** Going back to the decision to do all three reactor coolant pumps during this Unit 2 outage, not only did we accomplish that, but at the end of the outage, we conducted an integrated leak-rate test on containment. Plants are required to perform that test every 15 years. It's basically

a leakage test to make sure that the health and safety of the public will be protected in the event of a breach in the barriers of the containment building. It's a very complicated, three-day test. And we believe Surry is the only plant in North America to have replaced all three reactor coolant pumps and conducted an integrated leak rate test in the same outage.

**Lane:** More important, we met all of our outage goals. We finished under budget, kept radiation dose to workers low, and no Dominion personnel sustained OSHA-recordable injuries.

*Were there any other major projects performed during the outage?*

**Haduck:** One of the biggest items during these outages is to take advantage of the shutdown period to upgrade the plant to maintain equipment reliability. A lot of money was spent during this outage on upgrading our circulating water and service water piping. We were one of the first utilities to use a carbon-fiber lining material to help control erosion and corrosion of those pipes, the majority of which are 96 inches in diameter. That was a very, very big project for us.

**Lane:** We also did eddy current testing—an electronic test for leaks or weaknesses—on the primary side of the steam generators and sludge lancing on the secondary side. The testing is required by the Nuclear Regulatory Commission, and it's quite a large project. Another large project was to replace all of our station service transformers. That was a huge project, both cost- and execution-wise.

*I understand that you also completed your final beyond-design-basis modifications during the 2015 fall outage. Can you speak to that?*

**Lane:** Beyond-design-basis modifications are resolutions to lessons learned from evaluations of the accident at Fukushima Daiichi five years ago. The NRC mandated appropriate upgrades to U.S. nuclear stations, including alternate tie-ins or alternate piping flow paths to enable personnel to hook up mobile equipment to supplement coolant to the reactors and steam generators. We also have a series of large portable generators to provide emergency power. The modifications are basic piping and electrical changes to install flexible plug-and-play connections for mobile equipment in the event of a beyond-design-basis event.

*What other activities were performed during the outage?*

**Lane:** We replaced a third of the fuel in the reactor. We performed normal pump and valve maintenance and overhauls, including some auxiliary work on the turbine. We also overhauled one of the emer-

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gency diesel generators, which is quite large and is a five- to six-day activity.

**Haduck:** We also replaced two pressurizer spray valves, which are critical to maintaining the pressure in the reactor coolant system within the required levels.

**Simmons:** The key here is that we monitor plant equipment—valves, pumps, motors—and establish formal plans to ensure that equipment is healthy long-term. We try not only to maintain the plant but also to improve its condition. It's not the same plant it was 40 years ago.

*Who were the major vendors involved in this outage?*

**Lane:** Areva was instrumental in the reactor coolant pump replacement project. Babcock & Wilcox inspected the steam generators. BHI Energy provided contract radiological protection staff because we need additional health physicists during an outage to help monitor radiation dose. And our biggest supplier of manpower is Day & Zimmermann, which provides contract labor with a variety of craft skills.

*Regarding outage labor, how many were contracted employees as opposed to full-time staff?*

**Lane:** The Surry Power Station has around 800 to 860 employees year-round. We bring in about an additional 1,200 peo-

ple for large outages.

*Can you describe your methods for getting the contracted employees up to speed?*

**Simmons:** We have a process for preparing new employees to obtain a badge for unescorted access to the site. We like having people who have been here before or at one of the other Dominion stations, because they are familiar with Dominion, our leadership, our processes, and our policies. All new workers go through a detailed background screening. We put them through various training programs in human performance error reduction, including an expo where our permanent employees help ensure that the contractors understand our human performance and safety expectations. They also complete various training sessions that are both introductions to our expectations and job-specific. Once on the job, we ensure that contractors have direct Dominion oversight to reinforce our standards, especially in regard to safety. We have a pretty high return rate—I would say

in the 70 to 80 percent range—of folks who have worked for us before.

*How did you monitor dosage during the outage?*

**Simmons:** The reactor coolant pumps replacement project entailed more radiation dose than a normal outage, but we estimate dose for each job and then track what is actually received. That information is kept so that we can see if we're improving our radiation practices over time—using lessons learned to perform the work with less dose than in previous jobs. We have specific plans in three areas. One is “worker behaviors,” which ensures that workers understand that they should spend as little time in the area as

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they need to in order to do the work correctly, and that they stay in the lower-dose areas to perform as many of their work activities as possible. We train on that subject and we track the results. We know every entry into any radiation area and how much dosage was received versus what we expected. Plans that workers must follow are laid out in advance to minimize dose, and we keep a tight control on that to keep the dosage low. Second, we use “engineered safeguards.” This is shielding or other physical protection between workers and radiation sources. Last, if we find any areas we consider to have higher-than-normal dose rates, we’ll reduce the dose rate by flushing systems or installing replacements. And we were pretty successful in the last outage. We did more work for less dose than the previous outage. A lot of lessons learned in one outage are used to improve in future outages.

*What goes into the planning for these outages?*

**Haduck:** We actually begin outage planning two years in advance. It starts with the engineering products, the design changes that we’re going to implement. We make sure that they’re thorough and ready to implement by the time the outage begins. From that kick-off, the station sets and tracks 50 milestones over the months preceding the outage to ensure that we’ll

be ready, that we don’t need to make any adjustments close to the outage start date. Outage and planning has a team of 16 individuals from every affected department dedicated full-time to getting their departments and the station ready to execute the outage. That team meets three times a week, and they review everything from individual component work orders to large projects. They put together the schedule that the station uses for execution during the outage, otherwise known as our “Road Map for Success.” We have a very robust series of challenge review boards in which senior management gets an idea of readiness for key projects. This allows the management team to challenge the readiness all the way from parts availability to contingency plans to vertical alignment for the work area. The boards start basically three months out and track that all the way up through the start of the outage.

**Simmons:** We also do fleet challenges across stations. We bring experts in from the North Anna and Millstone power stations and have them assess our readiness at specified points in the planning process. The executives, including Larry, perform their own independent review of our readiness. We schedule multiple reviews just to make sure we’re on track and on target.

**Haduck:** For one of those challenge reviews, as Roy said, we use fleet expertise.

We also bring in industry peers to help make sure that we’re on track and to see if there is anything else that we can learn from others in the industry.

**Lane:** The formula for success in these outages is really in preparing 365 days a year. As Mike said, because of the complexity of this particular one, we started two years in advance. But it’s “all in” for the whole leadership team, management team, and project teams. We say that folks have three jobs—they have their normal job, their outage job, and then they have their emergency planning job. It’s really true that you have to wear three hats to work in this industry.

**Haduck:** I think the three of us would agree that the nuclear safety aspect is built into everything we prepare for. We assess our risk. We manage risk. We make sure we have our redundant equipment available. And when we put the final schedule together, it has a complete, full assessment from a nuclear safety standpoint.

*So would you say that, overall, this outage met all your goals?*

**Simmons:** We definitely met all of our goals on this last one. And we’ve met all of our goals for probably the last three outages that I’ve been associated with here. We are generally very successful.

*Continued*

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*Did any unforeseen problems arise during the outage?*

**Simmons:** You will always encounter something unexpected. I've never been associated with an outage that didn't, but we designate a specific team to review the schedule in light of challenges. There were a couple of equipment failures that needed to be addressed in the last outage, but nothing of significance. We just had to adjust the schedule slightly. We have a very thorough process for doing that.

**Lane:** During outages, we staff a "war room" that we call the Outage Control Center. It's staffed with 14 people at a time—24/7—representing every major department. It resembles a NASA mission control center. Everyone has a role and a responsibility. They spend time in the field and are in communication with people in the field. When an issue emerges, they obtain whatever resources it takes to resolve it. That's how we manage it in real time. We also have a mechanism to gather comments from workers to help us improve future performance—it's an e-mail address, to which anyone can submit comments, complaints, or suggestions about outage performance. The address is "Sam Outage" on the company computer system. We had over 200 critiques from the last outage. Anybody, regardless of position in the organization, who has an issue that they think needs attention or that

needs improvement for next time—no matter at what level, a small frustration or something big—can type up an e-mail and get instantaneous feedback as to an improvement item. Those items are captured real time and can be integrated into our next outage plan so we get incrementally better in every outage.

*Do you have any final thoughts you'd like to add?*

**Lane:** We couldn't do any outage, small or large, without the use of our suppliers, and particularly our supplemental personnel. The scope is just too large. We're staffed to run the units while online, not for a large outage. We tip our hats to the key suppliers. We're very much appreciative of them. Also, an outage is a fleet effort. The fleet shares its resources with us, both in the preparation phase and the execution phase, and we do the same for them. We could not be successful without those resources.

**Haduck:** For the majority of my career, I've been doing outages in some shape, fashion, or form. And I will tell you that the commitment to teamwork

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that the employees have here is at the top. In addition, the organization goes to great lengths to prepare for the outage. Our slogan is "Preparation, Preparation, Preparation," and the team really takes that to heart. We give them the time they need to prepare, and that leads to improvements in efficiency and execution of the schedule.

**Simmons:** An outage is something that we take seriously as a fleet as well as a station. We're committed to performing them with excellence. The bottom line is that what makes the plant successful is our outage time. The outage is our time to make sure the plant is healthy, to make sure it's going to run well until the next scheduled outage, and that we can provide reliable power to the community. **N**