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THE *NUCLEAR NEWS* INTERVIEW

James Sherrard: The nuclear workforce pipeline

Three Rivers Community College's Nuclear Engineering Technology coordinator talks about what makes the program one of the best in the country.

Sherrard: "This year we're having a very good year, as we are going to graduate 20 students."

The Nuclear Engineering Technology program at Three Rivers Community College in Norwich, Conn., is an intensive two-year program leading to an associate in science degree. Since 1983, working first with Northeast Utilities and later with Dominion Generation, the college has been a workforce pipeline for the commercial nuclear power industry.

Late last year, Three Rivers purchased a new glass-top nuclear simulator from Western Services Corporation. *Nuclear News* Associate Editor Tim Gregoire spoke to James Sherrard, coordinator of the Nuclear Engineering Technology program, about the new simulator and other factors that have helped the Three Rivers program gain national recognition.

Tell us about the new simulator at Three Rivers.

Our program had an earlier one-of-a-kind simulator that we purchased from Combustion Engineering in 1990 through a competitive bidding process. We had that simulator for 22 years, and it served us very well. As time went on, however, we would occasionally have breakdowns in the hardware and software. We were able to replace them as we went along, but finally it ended up that some systems failed and there were no backup parts available. So the system was no longer useful to us.

I looked at the simulator market to see what was available, and the glass-top technology, which is touch-screen, appeared to be the most promising because it's the type of system that commercial nuclear power plants have in their control rooms. It was also what was being sold for training for nuclear utilities and other applications—in particular, for governments, agencies such as the International Atomic Energy Agency, and other organizations. So I looked to see if it could be adapted to our program—that is, taking it out of a training environment and putting it into an academic environment.

We put out a competitive bid, and Western Services Corporation [WSC], of Frederick, Md., won the bid. The company has a distinguished history of providing glass-top technology to commercial nuclear plants and the other entities that I mentioned, but this was their first foray into the academic or educational world. I set up the specifications for what I was looking for, based on the success of our prior simulator.

The simulator was built over the summer, and I did the initial field testing, or factory acceptance testing, back in July. WSC made some modifications based on my suggestions, and the simulator was shipped here in the fall. In November, a WSC technician and training personnel came to install the system, train our technician in the care of the system, and train me and two adjunct faculty in the use of the system.

The simulator can be used as either two separate power plants or as one power plant, where on one side you have a student operating the reactor, and on the other you have students running the turbines and steam side of the system. That is probably what we will use most of the time, because that is the way we ran the old system. That way the students learn to run the plant as a team.

Students take simulator training the last semester they're at the college. It ties together all of the earlier course work that they've had—not only all of the nuclear course work, but also fluids, thermo, heat transfer, AC/DC machinery, and all of the labs that go along with that. So it truly is the capstone event for the degree program.

We have a simulator lab that we run every week and that is limited to four students. The students learn the safe operation of the plant, as well as transients, casualties, and malfunctions. At the end of the semester, I bring in a guest evaluator who has never seen the students before to administer a

To train nuclear engineering technology students, Three Rivers Community College purchased a new glass-top simulator from Western Services Corporation. Pictured in front of the simulator (from left) are Mark Davis, Three Rivers technician; Majid Mirshah, WSC's director of training; James Sherrard, coordinator of the Nuclear Engineering Technology program; Oleg Ivanov, WSC trainer; and Three Rivers adjunct faculty John Riley and Bob Salen.

one-hour oral exam on the simulator, where anything is fair game as far as operation, casualties, and other occurrences. The students' entire grade for the semester is based on that one oral exam. If they pass, they graduate, and if they don't, they have to wait another year to take the course over again.

Right now, the simulator is based on a generic pressurized water reactor. We plan over time to add plant specifics for the two-loop and four-loop systems that exist at Dominion Nuclear Connecticut's Millstone plant in Waterford. We then plan to add the three-loop system from Dominion's fleet in Virginia over the next couple of years, so eventually we will have a plant-specific simulator for each of Dominion's three types of reactors: two-loop, three-loop, and four-loop.

How will the students' time be divided between use of the simulator and the research reactor at the University of Rhode Island?

We use the research reactor at URI only in the fall of the second year of our two-year program. We run experiments there for which you need real neutrons. We do half-life experiments, control blade, excess reactivity—a number of experiments that you can't do on a simulator.

A simulator is based on the safe operation of a specific power plant. It's not a research reactor where you can do the types of things that we do at URI. With our simulator, we can simulate malfunctions on just about any subsystem within it. We can see how the systems perform and react, but you're not collecting data and doing analysis of that data. You're operating the plant to see how systems interact, how you respond to emergencies, how to bring the system up in power, down in power, bring it up from cold power as if it had been down for a refueling. It's the thorough, safe operation of the plant, with all types of transients, casualties, and malfunctions thrown in.

What would you say is the typical academic and career path for students in the program, and about what percentage go into commercial nuclear power or other nuclear-related fields?

The scholarship program we have with Dominion includes 16 scholarships every year, with full financial support for incoming freshmen. It includes a 12-week paid summer internship at the Millstone plant. Then there is the final full support for the second academic year.

That accounts for 16 students in the program every year. We have other students who come into the program who are out of high school, out of the Navy, out of industry, or are coming back to pursue a second career. Historically, we start with about 30 full-time freshmen every year. Attrition typically reduces that number over the two years, and we graduate anywhere from 15 to 20 students. This year we're having a very good year, as we are going to graduate 20 students, assuming that everyone makes it through the spring semester.

Of the group we graduate every year, approximately half want to go to work immediately in commercial nuclear power. Most of them want to work in operations or engineering slots, where starting salaries are about $63,000. Others might go into other

areas such as health physics, instrumentation and controls, electrical maintenance, and mechanical maintenance. Any job is pretty much fair game for them.

The other half typically want to go on and get their baccalaureate and master's degrees, and the most common fields are nuclear engineering and health physics. In recent years, I would say the trend has been more toward health physics than nuclear engineering, primarily, I think, because of the diversity and the number of jobs out there.

Most of our students tend to go to the University of Massachusetts at Lowell, primarily because it has baccalaureate, master's, and doctorate degrees in both of those fields. Plus, it is in New England, so it's fairly close to us. Students can come home to visit family. The two UMass programs work closely with us in helping the students get jobs, find housing, and that type of thing. They'll accept up to 60 credits out of our degree program. When students leave here, if they take the right courses their last semester, they can transfer in as an entering junior, complete the baccalaureate program in two years, and then stay on a third year to get their master's degree.

The other nice thing is that within New England, there is something called the New England Compact, where if the next step in your degree program is not offered in your state, you can go to any public university within the six New England states that offers it and pay just a slight surcharge over the in-state tuition rate. There is no next step in Connecticut, as we are the only college or university in the state that has any type of nuclear or health physics degree program. The only other public institution in New England that offers those programs is UMass Lowell, and students can go there relatively inexpensively. But they do go to other programs throughout the country, such as Penn State, the University of Tennessee, and the University of Florida.

In 2014, the Nuclear Engineering Technology program won an award from the American Technical Education Association. Can you tell us about that award and what it means to the college?

The ATEA is a group of educators and industry representatives who strongly support technical education. Every year at their national conference they present awards for the outstanding technical faculty member of the year, the outstanding technical student of the year, and the outstanding technical program of the year. Within the last couple of years, the ATEA established an award to recognize the business or industry that best supports technical education. The awards are for any technical discipline—electrical, mechanical, nuclear, environmental, civil, you name it—at a two-year or four-year school in any of the 50 states. We were fortunate enough to win the outstanding technical program award last year, and that's a big deal. [See *NN,* July 2014, p. 79.] The previous year, Dominion Nuclear Connecticut received the award for the business or industry that best supported technical education because of its sponsorship of our scholarship and internship program.

Also, over the history of the program, we have probably had five of our students from the college selected as the outstanding technical student of the year.

William Magwood, formerly a commissioner on the Nuclear Regulatory Commission, visited Three Rivers recently. What was the impetus for the visit and what was discussed?

I got a call one day from Commissioner Magwood's chief of staff, Patty Bubar, and she said that the commissioner had heard about our program and that it was the best nuclear technology program in the country, so he wanted to come and see it. He's been very supportive of higher education. I gave him a full tour of the laboratory, including the health physics lab and simulator lab. The new simulator had not been delivered at that time, but we had a video of what the simulator looked like. Later, he actually went to the WSC site and saw our simulator in field testing before I saw the final

product. So he got to demo it before we received it. That was just serendipity.

When Magwood came here, he was really impressed with the program. We had a 90-minute session where he met with the students to discuss anything and everything. We set it up so that it was just the students and him—no faculty or administrators. It was a closed-door, anything-goes session. He asked the students about the program, jobs—whatever he was interested in knowing. And I gathered that they asked him a lot of questions about the NRC, including what it does and how it functions. As he was leaving, he told me that he was really impressed with the caliber of the questions asked by the students, as well as with the overall program. We were told that it was the first time a sitting commissioner had visited a nuclear engineering technology program.

"The students who graduate from the program are readily accepted into baccalaureate programs, and they routinely find good jobs in business or industry."

Given the events at Fukushima Daiichi and the delay in progress in new nuclear builds, how would you rate student interest in nuclear engineering?

At least from my perspective, we have not seen a reduction in the number of students applying for the scholarships or coming into the program. The students who graduate from the program are readily accepted into baccalaureate programs, and they routinely find good jobs in business or industry.

I tell the students to think outside the box as far as looking at job opportunities outside southeastern Connecticut, because there are a lot of other jobs, and our program is well known nationally. So I tell them to apply to the nuclear utilities in the South, in the West, in the Midwest, or to apply to other universities if they want to continue their education. And they have taken heed of that advice. They apply and get accepted at power plants throughout the country. They go to baccalaureate programs outside New England, depending on what their interests might be. We've had a very high placement rate.

One thing I have to talk to them about that I don't think a lot of people realize is that because of 9/11 and a couple of other instances—not that security was not difficult before—but the badging and security background checks for the industry are quite extensive now. The students have to make sure that they have a positive record—no drug or alcohol convictions, no police record.

Another thing that has come up since then is that employers put a lot of emphasis on credit history. That's because if you have credit problems, then they will say that you are subject to coercion or bribery, and you will not get a security clearance. So I have to remind the students to make sure they have a positive credit history and don't do anything crazy that would jeopardize their background security checks. It's a lot different for the grads today than it was say 20 years ago. And you sort of expect that. You expect things to tighten up because of security concerns. It certainly makes sense, but they're young and you have to remind them on occasion of the light at the end of the tunnel and what the ultimate prize is. The salaries are quite good, and as long as they're willing at times to leave the area, they don't have any problem finding jobs. NN