THE *NUCLEAR NEWS* INTERVIEW:

Coovert: Human performance training at Exelon Nuclear

Life preservers, "Murphy's Alley," and colored markers all find their way into nuclear plant training classes.

Bob Coovert takes a "hands-on" approach to his job as human performance program manager for Exelon Nuclear. Scuba tanks and colored markers are part of his classroom training, and he isn't shy about seeking out students who avoid eye contact in hopes of not being called upon.

Coovert, who has been with Exelon (and its predecessors Unicom Corporation/Commonwealth Edison Company) for 19 years, started developing his own style of training six years ago when he headed up a human performance program at the company's Braidwood nuclear power plant. While at Braidwood, he put together a team of analysts to search for root causes of problems in human performance. "In looking at all of these things, we kept finding a human at the end of most of these events at the station," he said. It was then he decided to educate himself in the area of human error reduction.

When Unicom merged with PECO

Energy Company to become Exelon in 2000, Coovert was tasked with heading up human performance efforts for the company's nuclear power plants. Each plant now has a human performance specialist with whom Coovert works closely to coordinate the efforts of a company-wide program. "In my position, I mainly train the trainers," he said. "I train the training instructors or people who would be expected to return to their work groups and pass on some of these concepts." But he also works with control room operators, administrative personnel, shop workers, and, on occasion, overseas personnel associated with the International Atomic Energy Agency.

Coovert talked about classroom ideas and the effectiveness of "hands-on" training with Rick Michal, *NN* senior associate editor.

Coovert: "Not every standard operating procedure will cover every plant situation."

How dependable are standard operational procedures for control room operators?

They are dependable about 99 percent of the time, but a procedure can't be written for every possible scenario. We see this in events throughout the industry every day. We try to make it so that an operator's behaviors become a fundamental part of his job. If an operator is trained to take the right action, and if he or she is in a position where a procedure clearly covers a situation, then he or she should, because of training, respond in the appropriate manner. This should be consistent with that operator, and with the other operator who was trained with him, and with the operators on other shifts who were trained the same way. That's what

a highly reliable organization is striving for, to achieve common organizational practices. We want those practices to be fundamental and consistent throughout the organization, because not every standard operating procedure will cover every situation that occurs at a nuclear power plant.

You have said there are simple rules for changing workers' behavior: training, reinforcement, and accountability. Could you describe how these rules work?

The first one, training, is a simple concept. If a worker needs training in some area, it's easy to identify a need because that worker is going to display a lack of skills or a lack of knowledge in his work

performance. In that regard, we develop structured training for the worker.

Next comes reinforcement. If we don't reinforce that training, then very quickly the worker's behaviors will fall back to where they were previously. The foundation for our reinforcement work is something we learned from the FAA [Federal Aviation Administration]. The FAA believes that the absence of continued reinforcement leads to a regression in behavior and attitude, to almost a pre-training level. So, if a supervisor or department manager is not out there consistently reinforcing good work habits, then very quickly the workers will go back to their old habits.

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The last part is accountability. Once a worker has the skills and knowledge, and the desired behaviors have been reinforced, then at that point we need to hold the worker accountable in order for the behavior to become habit. For that behavior to be fully understood, the worker must be constantly motivated to perform the appropriate action.

Once a worker leaves a training class, who is there to reinforce the new work habits?

It's the job of the individual's supervisor and peers to reinforce the new behaviors. We at Exelon have identified the fundamentals for each job position. These fundamentals are the desired behaviors appropriate for an individual when performing his or her task. Having a clearly identified list of behaviors allows individuals to understand what is expected of them, and what behaviors they need to reinforce in other team members.

Is it correct to say that adults learn in two ways: by doing, and if it is personally important to them?

Yes. There are a lot of studies that have been conducted in the area of adult education and the way that adults learn. When those studies are boiled down, it comes down to those two principles. The first part is that adults learn by doing, and there is a tremendous amount of empirical data that supports that. When a worker uses his hands to do something, he or she very quickly understands what he is doing.

The second part is that because we as adults have a lot of biases built in, we put ourselves in a position where we don't want to learn something if it isn't personally important to us. Just because a supervisor says, "I want you to learn this," a worker probably won't learn it unless he feels it's personally important to him or her.

How do you change attitude and motivate an individual to learn?

Many times we have to put a worker in a situation where he or she can understand something in a non-intimidating way. A worker might be in a situation where he has a mental model of how something works. Meanwhile, the actual situation in front of him may be different from his mental model. I can relate this to the very complex errors that were made by control room operators at Three Mile Island.

For an individual who has difficulty accepting what is being taught, the best way to get through to him is by a "hands-on" experience. A hobby of mine is deep sea diving, and in my classes I use a "buoyancy control unit" (BC)—it looks like a life preserver—and I put it on a worker and show him or her all the gauges and hoses. Then I ask questions about how he or she thinks the unit works. The response will be based on a simple mental model, i.e., "If I put air into

this thing, I'm going to float up to the surface." Then I walk the worker down the road, explaining the dangers of following a mental model. For instance, filling the BC with air would raise the worker rapidly to the surface, but if done too quickly it could lead to what is known as the bends, which is a decompression sickness that could lead to death. Another danger would be air expanding too rapidly in the lungs, resulting in possible lung embolisms.

What other hands-on exercises are done in classroom training?

There is one where I take two felt-tip markers and ask two classroom participants to identify each marker by color. It sounds simple, but the markers actually have different colored caps on them, i.e., the blue marker has a green cap on it, and the green marker has a blue cap. So I try to demonstrate a team error. I tell them, "I'd like you to identify the blue marker. I want you to get the concurrence of your coworker that it's the correct marker." That's the reason the two workers are together, for a second pair of eyes. The first worker will usually point to the blue cap on the marker and say, "This is the blue marker." And the partner will confirm by saying, "I concur that it's the blue marker." Then the first worker will say, "I will now pick up the blue marker," and he or she does.

Then, for the exercise, I take the blue cap off the marker and I draw on a piece of paper a green line—which, in the workers' minds, should have been a blue line. This exercise allows the workers to see that they relied on each other to verify the right color, but in fact they demonstrated a latent error. This exercise relates back to the plant because it's the same as a clerical person putting a Unit 1 procedure in a Unit 2 work package. So the lesson learned here is that the second worker really has to have his eyes open and question everything about the situation, independent of what the first worker has done.

How would you describe your classroom style and how students relate to you?

I developed a lot of my style from my years in the classrooms. Control room operators are a very difficult group to motivate in a classroom, so I am constantly looking for ways to engage them. Over the years, I've developed personal techniques that have proven to be successful in order to keep people constantly engaged. I've

been told I'm enthusiastic, and I tend to be assertive in that I try to get my point across while allowing people to provide input. I do engage the classroom, calling on various people to give me responses to questions. However, I don't intimidate. I ask a lot of questions for two reasons: One

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is for engagement, because everyone is sitting there wondering if they are going to be asked the next question. Second, because I need to know if the people in the class are understanding the information.

If there is someone in class who is trying to avoid eye contact, then I will call on that individual. I will realize that he or she is avoiding engagement and trying to withdraw from the class. I won't do it in an intimidating way. I'll ask a simple question, something that I know will bring that person into the class and break the ice. I'm not going to go after that person in an aggressive way.

What is the normal size of a training class?

It varies, but I would say anywhere from 16 to 40 people per class. The class structure varies, too. I've taught everything from a one-time, four-hour work fundamentals class here at Exelon, to a week-long human performance and events analysis class in Lithuania.

What are dynamic learning activities?

DLAs, as they are known, are activities in which people are put into situations similar to what they would find on the job. It allows them to interact with other workers, and allows the trainers to put potential problems into the work environment and process. It's a good exercise for demonstrating an understanding of a behavior, or a lack of understanding it. For example, a DLA would typically be set up so that workers would have to wear appropriate safety gear, follow a procedure as they would in a plant, etc. We as trainers would be there to provide the basics of "how to" for a job, give them training suggestions, and offer reinforcement on practices. These are all steps of the DLA process.

Exelon conducts simulations using "Hogan's Alley" and "Murphy's Alley." What are they?

I think these sorts of simulations are becoming more common in the industry. The term we use for them is "work environment simulators," because they do a great job of creating a work scenario in a made-up environment. "Hogan's Alley" is the name of the shop simulator used by the Oyster Creek nuclear plant. Oyster Creek has been doing great work with it for several years now. "Murphy's Alley" is the name of the one at Clinton power station. These simulators create situations dealing with pipes, valves, motors, breakers, and switches. Workers go into a simulator and demonstrate how they would perform some of their error-likely tasks right there without it actually being in the plant.

What are the good, the bad, and the ugly of human performance training?

The good is the experiential learning because it really works as part of human performance training. It gets back to the two fundamentals I mentioned earlier: If a worker is given a new "hands-on" experience, he or she will learn it and understand it much quicker.

All levels of workers can benefit from experiential learning. When I say that, I don't just mean levels of workers who actually touch the plant. I mean working levels from the plant manager, site vice president, and all the way to the worker who cleans the shop. I've had training sessions at the plants

tals can be built into almost any training session, whether it's for a control room operator or a clerical staff person. We've done human performance training for clerical people because of all the latent errors they can build into the processes for workers, such as putting a wrong procedure into a work package, hitting the wrong key on a computer and changing the surveillance frequencies, etc. We can build human performance fundamentals into any type of training out there.

Now to the bad of human performance training. In many ways, it's difficult to measure the return on investment, probably more so for a small plant. There just aren't a lot of lower-level indicators to say human performance training is improving or getting worse. However, with a large nuclear fleet like Exelon, it makes it less difficult to stand back and observe. We do have performance indicators that demonstrate good improvements over the past several years in human performance training, but it's still hard to measure the return on investment for it.

It's also hard to find instructors with the right skill set. It's not so much competence from a knowledge standpoint, but instructors must have the ability to use experiential learning in a lot of what they do. It's a tough transition for trainers who constantly train on technical matters to change the way they do things. They have to build human performance into training, and experiential learning needs to be part of that.

Consistent management support can be difficult to come by, also. Success in human performance training comes from alignment, whether it's the alignment of a site, or the alignment of a corporation. It's important to stress that everyone needs to buy-in to this training or else there will be limited success. For example, there may be success in the operations area, but there may not be that same success in the instrument maintenance area.

The ugly would be the cost of human performance training. Everyone is carefully watching their money, what with deregulation and the economy the way it is. Training is an expensive item in any format. And if work environment simulators are available, plants sometimes get in situations where departments compete for their availability. Also, in some cases, the cost of running a simulator is prohibitive. Some of the scenarios in a Murphy's Alley take two to

four hours. They take quite a bit of time and money.

You have mentioned latent errors. What are those?

For example, if a clerical person puts the wrong surveillance in a work package, that would be a latent error, and then that accident-waiting-to-happen would become a latent condition. A latent condition is something in a work process that is waiting to bite someone. It would bite the plant when the worker started doing the wrong surveillance and tripped the plant.

The Nuclear Regulatory Commission has done a lot of research over the past several years to find out what has the most impact on plant events. What the NRC has found was that latent conditions, entered through the plants' maintenance departments, have the greatest impact. That's one area we try to focus on for improvement.

When a training class is completed, do you grade the classroom participants and, if so, what do these grades mean?

It varies. There are different methods of evaluation that we use. We do everything from written quizzes to hands-on demonstrations to going back into a work department and doing what is called a job performance measure where a worker is evaluated on demonstrating a task. When we do evaluations for actual work tasks, there are fundamental behaviors for which operators, engineers, and mechanics are evaluated. These human performance tools are part of those graded evaluations. There are many different levels of evaluation.

Earlier you mentioned the FAA. Is there something else the nuclear industry can learn from that organization?

There are a few other things I will mention. The airline industry has an impeccable safety record when comparing the number of accidents per year versus the number of people who fly per year. Literally, the number of people who fly goes up exponentially, yet their level of accidents has remained almost flat. The airline industry continues to do things with a focus on cultivating a safety culture.

By contrast, in the nuclear power industry, there is great variability in the impact of programs even after training. A lot of it is due to the incomplete acceptance of concepts and practices by instructors and managers. The lesson learned from this is that if all the instructors and managers are not bought-in, then a lot of these concepts are going to fail, such as the program I mentioned earlier about continued reinforcement.

The nuclear industry also has an absence of reliable data. At the FAA, they continue to develop new ways to find reliable data on events. That's one thing that the nuclear industry continues to struggle with. **NN**

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where, after hours, the site vice president was standing next to me to make sure that department directors all understood what three-way communications looked like. We found that if directors didn't have a clear mental model of three-way communications or other error-reducing techniques, it was difficult for them to understand the appropriate behavior needed in a situation or if appropriate corrective action was needed.

Also, from a training and reinforcement standpoint, human performance fundamen-