THE *NUCLEAR NEWS* INTERVIEW

Tom and Dixie O'Dou: The importance of management in radiation safety programs

Workers' awareness of radiation risks is not enough to keep a radiation safety program in compliance with its license, according to a husband-and-wife team of health physicists.

Radiation safety programs are designed to provide for the safety of individuals who work with radioactive materials and radiation-producing machines. A good program allows workers to feel secure in their awareness of the risks associated with their jobs.

But awareness of radiation risks is not enough, argues the husband-and-wife team of Tom and Dixie O'Dou. The O'Dous, who are health physicists, explain that a radiation safety program is likely to fall out of license compliance unless periodic, unbiased assessments of the program's management are done. Such assessments would ensure that the program is keeping in line with license conditions. "It would also verify that the program is healthy, supports the areas that it maintains as safe, and protects the company from risks associated with allegations, threats, bad morale, or poor management practices," Tom O'Dou said.

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Dixie O'Dou: "It is an NRC requirement to call attention to a program to keep it on course."

Tom O'Dou is the director of the Radiation Laboratory at the Harry Reid Center for Environmental Studies, a research arm of the University of Nevada at Las Vegas (UNLV). O'Dou has been a health physicist since the 1970s and has worked in that capacity for the nuclear Navy, the Department of Defense, and at nuclear power plants in the United States.

Dixie O'Dou admits that she got into health physics (HP) on a dare. An English major in college, she got a non-HP job at the naval nuclear shipyard where her brother worked in quality assurance. He told her about a program offered at the shipyard that included an HP component, but added that the program would be too daunting for her because "women never succeed in health physics." That was enough of a dare to get Dixie to enroll in the program, and she became one of five women in the nation at that time (the 1970s) to complete the Navy's civilian HP program. She later went on to work at 13 nuclear plants in 11 states.

The O'Dous are both Registered Radiation Protection Technologists. Tom is also a Certified Health Physicist (CHP), and Dixie is an electrical engineer. They are the founders and principals of Rad-Ware Inc., an HP software and services company headquartered in Nevada.

The O'Dous' comments in this interview are based on their paper "Risk Associated with Management of a Radiation Safety Program," the subject of their poster presentation during the Health Physics Society's Annual Meeting in Portland, Ore., July 8–12, 2007. The interview was conducted by Rick Michal, *NN* senior editor.

Risk associated with management of a radiation safety program—would that be aimed at one type of program, such as a university program, or would it apply generally across the industry?

Tom O'Dou: I think it's pretty much universal. It applies to most radiation safety programs and identifies several goals that people should aim for as they operate and manage a program. One goal is to provide for the safety of individuals working with radioactive materials and radiation-producing devices, while allowing them to complete their task or research. The program must also ensure that there is minimal environmental impact and minimal exposure of members of the general public, which are key to any successful program. These goals are what make radiation risk management so universal.

What are the essentials for the proper operation of a radiation safety program?

Dixie O'Dou: The essentials are that the program must ensure adequate manpower to be in compliance with regulations, and it must provide adequate training so that people can minimize their dose. There are other things, such as that the program must conduct constant evaluation of contamination control through surveys, offer methods to control internal and external dose, and ensure the minimization of radioactive waste production and the proper disposal of waste and waste products.

The program also needs to be well documented and must provide a basis for protecting the facility or site from unnecessary legal actions. Most of these things, although they sound very routine, are guided by regulatory commands. The Nuclear Regulatory Commission has regulations—10CFR20 and 10CFR30, for example—that provide a definition of a well-operated radiation protection program. Also, the NRC Agreement States assume some of the NRC's regulatory authority to license and regulate by-product materials. Occasionally, these states have regulations that vary from the NRC's, but they are at least as restrictive as the NRC regulations.

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What happens if a program is not in regulatory compliance?

Tom O'Dou: The NRC or one of its Agreement States might fine a program if it is not in compliance. It is interesting to note that the state of Nevada, an Agreement State, does not have the statutory authority to assess fines on a noncompliant licensee. Instead, Nevada might shut down an operation involving the use of radioactive materials if it found the radiation safety program to be in noncompliance. There are other options, such as putting limitations on how the licensee can use the radioactive materials, but Nevada's ultimate penalty is to take away a license and remove all of the materials. Of course, the state's first option is to work with the licensee to bring its program into compliance.

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Could a radiation safety program appear to be in compliance but still have problems?

Dixie O'Dou: Absolutely. There may be issues associated with training that make things cloudy. For example, let's say that an individual goes through a radiation safety training program, but the program does not provide adequate assurance that the individual understands the operation of a radiation detector. The compliance aspect of training focuses only on whether the training has been completed, not on how effective the training was in ensuring an individual's complete understanding. In the situation I just described, the individual could appear to be properly trained on paper, but he or she may not possess the hands-on skills required to render an accurate survey using a radiation detector. In such a case, the program's management must ask itself, "If this individual goes out to survey an area, how accurate will that survey be, and how safe will it actually be for the workers who will be doing a job in that area?" If management is not 100 percent sure of the safety of its workers, then there are problems with that program, even though it may appear to be in compliance.

What happens when management focuses only on those things that need immediate attention in a program?

Tom O'Dou: If a program only "fights fires," so to speak, then the resources devoted to the entire program tend to get exhausted before all areas can be adequately addressed. All program areas need support—compliance, training, surveys, observation, regulatory assistance, and quality control—because as a whole they are more critical and long term than any of the "fires" that might start up. Ultimately, if management focuses only on emergent issues, the program is destined to fail because the ability to properly manage the program is lost.

Dixie O'Dou: Management, in fact, in accordance with regulatory guidance, is required to provide support to ensure that a properly operating program is in place. But in some cases where an inexperienced manager is in charge, the needs of the program may not be met and a situation may develop where the program no longer meets the regulations or license requirements. A regulator at some future inspection would identify such a situation, and the regulator would take action to bring the program into compliance. There have been cases, however, where upper management has been notified of being out of compliance and the consequences have been explained to them, and yet they have continued to ignore this call for help. In such a case, the radiation safety officer [RSO] has the responsibility to identify the situation to the regulator. This is what the RSO *has* to do. It is an NRC requirement to call attention to a program to keep it on course.

Nuclear power plants have the resources to provide constant and immediate radiation monitoring of workers. For smaller organizations, could higher exposures go unnoticed because of extended monitoring periods?

Tom O'Dou: Yes, they could. Different facilities have different time periods for which they do monitoring, based strictly on economics. It's true, nuclear power plants have been doing real-time monitoring for years, using pocket dosimeters and electronic dosimeters, but smaller facilities may

not be able to put the funding into those kinds of devices. For example, at the Harry Reid Center we have a two-month monitoring period, and we use optically stimulated luminescent dosimeters to cumulatively measure exposure over that time. In our case, if a high exposure to radiation were to occur early enough in our monitoring period, we might not know about it until weeks later. This is why it is so important to have administrative controls in place to ensure that there are no high exposures. An example of an administrative control could be something as simple as not leaving a door open that could lead someone to a place where they could receive a high exposure.

How can a radiation safety program's management be confident that its training is effective?

Tom O'Dou: We do it by focusing continuous attention on the individuals who have been trained. The Harry Reid Center has 10 authorized radioactive materials users. They are research scientists, postdoctoral scholars, and professors in the radiochemistry program. Each of them was trained in radiation safety methods by previous employers and by me as a step in their authorization to use radioactive materials at UNLV. There are also many other radioactive material users at UNLV, in many other departments. Each user is responsible for making sure that we live by the rules and regulations associated with our radioactive materials license.

The authorized users also have the responsibility of ensuring that students and visitors who are using radioactive materials minimize their radiation exposure and maintain appropriate contamination control. We do this by being aware of what the students are doing at all times while in the laboratory. In cases where an individual is found to be handling radioactive materials inappropriately, or not acting in the best interest of the facility, the individual is counseled to make sure that he or she better understands the issue.

We also make sure that any issues are communicated back to our trainers so that they can realign their techniques to make better connections with students during training. For example, years ago we saw that the practical training associated with using contamination-control instruments was ineffective. We changed the training to focus on the actual measurement of radioactive material on surfaces, showing the geometry of the radiation detection device, the appropriate scan speed, and how to identify the presence of activity in a location.

Does computer-based training always work?

Tom O'Dou: No. In my opinion, computer-based training has always had the potential to fail. There is no mechanism to ensure that there is an understanding of the material by the individual who is taking the training. Students could take a computerized test that examines their ability to regurgitate material, but it doesn't prove that they know how to control contamination, minimize their dose, use an instrument, or take a survey. There is too much at risk—regulatory, legal, and personnel—involved with radioactive materials. There should never be an assumption that computer-based training will ensure adequate teaching to provide control of these materials and dose to personnel. The bottom line is that computer-based training is not enough.

"Ultimately, if management focuses only on emergent issues, the program is destined to fail, because the ability to properly manage the program is lost."

Dixie O'Dou: That's why hands-on training is so important. Here is one simple example: Training will teach an individual that if there is a zipper up the front of the protective clothing that will be worn inside a highly contaminated area, a piece of tape should be used to seal up that zipper. When the job inside the contaminated area is done and the individual comes out, eventually that piece of tape will have to be pulled off. But, should it be pulled from the bottom up, or from the top down? Pulling the tape in one direction increases the probability of intake, but the other does not. The answer is that the tape should be grabbed from the top and pulled down. If grabbed from the bottom and pulled up, contaminants could possibly be pushed up into the individual's nose. In my opinion, a live person is needed to teach that lesson, not a computer. Also, a trainer must feel confident that the concept is understood.

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Are radiation safety trainers usually certified health physicists?

Dixie O'Dou: No, in fact it is rare to see a CHP teaching basic radiation safety. For smaller venues, such as universities or small businesses, HPs are usually hired to do the training. But that's not necessarily true in the nuclear power industry. I've been in many training classes at nuclear plants where the trainers were just that—professional trainers. I think that some trainers have the ability to convey a lesson in the classroom, but if they were dressed in protective clothing, equipped with radiation detectors, and sent out into a nuclear plant, they wouldn't know what to do. The safety of workers is potentially at risk in a facility where the effectiveness of safety training is not correctly evaluated.

How important is the reporting chain-of-command in ensuring an effective program?

Tom O'Dou: Very important. I think that the RSO for a facility should report directly to a senior vice president, and preferably to the president of a company. The NRC prefers this reporting method, too. When there is that connection between the RSO and the head of the company, the program is much less likely to have problems. That's because the company head realizes the importance of the radiation safety program and has made a commitment to fully support it.

Dixie O'Dou: We have seen cases where a middle manager in the reporting chain has not understood that supporting the radiation safety program is critical, and so the RSO was not given authority to report to the president about an issue that was negatively affecting the program. Ultimately, because of this lack of direct communication, some programs fell out of compliance.

The things that could happen as a result of management's indifference include the release of radioactive materials to the environment, individuals' being exposed to higher levels of radiation than they should be, and the loss of the radioactive materials license. That's the major point we want to get across—that these things can happen and have happened as a result of management's not paying attention to the needs of the radiation safety program. NN