NEA's role in radiological protection—Keeping things real

BY DICK KOVAN

The Paris-based OECD Nuclear Energy Agency (NEA) is made up of the most technologically developed countries in the world, many with advanced nuclear industries and mature safety and regulatory organizations, all working to the highest standards. Its work is focused on developing sound technical and scientific approaches that governments can consider when addressing outstanding technical and regulatory issues and on developing international consensus and identifying emerging issues. Its activities are planned and carried out by expert committees and working groups of specialists.

The NEA's work in the area of health physics is led by the Committee on Radiological Protection and Public Health, which is made up of regulators and radiation protection experts. The committee's commitment to fulfilling its responsibilities to protect the public, workers, and the environment has led to a wide and active program of work. Ted Lazo, the committee's scientific secretary at the agency, helped provide some insight into what the NEA contributes to this field. Lazo came to the NEA in 1993 after working with Electricité de France and Framatome in France, and before that, at the Three Mile Island nuclear power plant and Brookhaven National Laboratory in the United States.

THE COMMITTEE ON Radiological Protection and Public Health (CRPPH) of the OECD/NEA, explained Ted Lazo, like the other main committees of the NEA, brings together two communities: The regulatory community and the expert community, which provides technical advice to regulators and governments. What is fundamental to the way the NEA operates is that committee members serve not in their national capacities, but rather in their functional capacities, to address radiological protection problems. The committee provides a place where people can put anything they want on the table. They share ideas and experience. They ask how others are addressing issues like the ones they are facing. They brainstorm issues that are emerging or even those that a member thinks might pose challenges in the future.

Despite the wide range of activities, Lazo said, the committee's program is very much focused on practical priorities and is quite coherent. The CRPPH also serves as a springboard for the next generation of radiological protection specialists, providing a place where experience not only accumulates but is made readily available. "It takes time to gain knowledge and understanding of this subject," Lazo said. "Radiological protection is historically very complicated because of what has happened, why it happened, and what measures have been taken. It is important to be aware of this evolution. At the same time, new ideas and approaches are brought to the table by the new generation."

Lazo

The NEA assists member countries in the regulation and implementation of radiological protection for workers, the public, and the environment.

A review is now under way to identify which policy, regulatory, and applications issues will or could emerge in the next five to 10 years. The list will provide the committee with a blueprint for its work program. To start the process, the committee formed two working groups, one to identify and assess challenges to its scientific understanding of the effects of radiation (the risk assessment group) and the other to look at the political, regulatory, and social issues that will affect its ability to provide protection and control risk (the risk management group).

"In the science area," Lazo explained, "there are many indications from radiation biology, genetic studies, and epidemiology which suggest that our idea of dose needs to be updated. For example, the 'bystander' effect, in which cells nearby the one that is hit by radiation may cause cancer or be part of its generation. Another phenomenon being studied is genomic instability, where a mutation might not be seen until two or three generations following irradiation. These tend to suggest that our current concept of dose may not be right.

"If internal and external doses are different and not additive," he continued, "if small chronic exposures really do have a different response curve than larger acute exposures, we may need to rethink the concepts underlying our protection system and how we use radiation, including in medical treatment.

"Questions on whether there is a threshold, or if risks are different at low exposures than at higher exposures are being studied at the molecular biological level, as well as by epidemiology," Lazo added. "Naturally, we are trying to bring this information together, but how are the regulator and the policymaker in government to deal with that uncertainty? Those are the kinds of things that the science group is looking at."

Having seen the growth in public skepticism of how governments have dealt with technical issues over the past 15 to 20 years, the risk management group is concerned with the impact of social and political issues on radiological protection. For one, on many issues, so-called stakeholders are pushing to have their concerns and views taken into account. A stakeholder can be a member of the public or a representative of a group—for example, a nongovernmental organization, another industry, or even another government ministry that has an interest, but not necessarily decision-making power, over the issue of concern, Lazo said. All want to be involved in the discussions and decision-making, and so the committee thought it would be useful to look at how these social changes developed. For example, the risk management group has looked at how the International Commission on Radiological Protection (ICRP) has moved to using a very open process in developing its latest recommendations and the consequences of that move. The process is now stakeholder-driven, to a certain extent. Stakeholder involvement is also filtering into the decision-making processes on legacy issues, decommissioning, environmental protection, naturally occurring radioactive materials, and others.

These two groups are to produce reports for the committee by March 2006 for use as roadmaps to prioritize studies and work over the next several years, Lazo said.

"I might add that the first such review, referred to as our 'collective opinion,' was done in 1994," Lazo said, "when the committee decided to look at the implications

of the latest set of recommendations from the ICRP set out in its Publication 60. The new review is taking account of the main elements of the next set of recommendations, which are now in draft form."

Agency connections with the ICRP

The NEA works closely with the ICRP to ensure that any recommendation it proposes is feasible from the point of view of practitioners and regulators. During the CRPPH's annual meeting in March, Lars-Erik Holm, the incoming ICRP chairman, provided a frank discussion of the state of the new recommendations being drafted. In particular, because of the many comments received during the consultation period, the ICRP decided to prepare a new draft. The comments from the NEA mostly concerned practical issues and user needs. The new draft should be on the Web by the end of the year or in early 2006. There will then be another three-month consultation. It was also agreed that near the end of this period, the NEA will organize a broad stakeholder conference to discuss the final draft. CRPPH has already organized two such meetings—in Taromina (2002) and Lanzarote (2003)—whose proceedings were published. This will give the radiological protection community and other key stakeholders the opportunity to give their views to the ICRP before publication. As a precursor to that, the CRPPH also set up its own group to do a line-by-line assessment of the new draft to look at its implications.

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The current draft took in many concerns that had been raised by earlier drafts. In particular, many people had found the concept of "dose constraints," which was at the heart of the first drafts, confusing. The ICRP has taken this on board and clarified the description, particularly explaining what "constraints" are intended to do, Lazo said. Another concern was what Lazo called the apparent downgrading of the "justification" concept. This was done because generally speaking, it is mainly policy- and decision-makers, not practitioners, who decide whether or not a "practice" could be carried out. The feedback, however, was that justification must remain a cornerstone of the control regime. The ICRP has taken that on board, too, and is going to reinstate it in its current podium position.

One of the remaining key issues has to do with the extension of the recommendations to the radiological protection of the environment. Despite having already toned down its proposed recommendations in the current draft, there is still a broad opinion that the line the commission is taking is too constraining, Lazo said. While it is generally agreed that the ICRP should include some guidance on protecting the environment, most believe that it is best to use a light touch on this issue. After all, he said, the environment is now well protected, with the environmental impact assessments that are performed, the environmental impact statements that are produced, and the many requirements and regulations that are in place.

Furthermore, as some in the radiological protection community have pointed out, universal harmonization is not really needed in the approach taken by individual countries to protect their environment. In reality, Lazo said, "the environment does not move," so what one country does within its own borders is highly unlikely to affect other countries. If practices in an individual country do not reflect common standards, he added, the world community would certainly press them to raise their level of environmental protection.

It has also been noted, however, that there is value in bringing environmental protection into the overarching radiological protection framework. Lazo believes that this brings a far more unified and philosophically clean approach to radiological protection, which must be reassuring to the public. To explain that no matter what the situation or practice—nuclear power generation, medical uses, an accident, or contamination—the same basic approach will be followed will, he believes, reassure the public and regulators.

Emergencies and contamination

Handling nuclear incidents has also become an important part of the radiological protection program. The International Nuclear Emergency Exercises (INEX) program was one of the NEA's responses to the Chernobyl accident. The NEA completed two INEX series in the 1990s (plus an intermediate exercise called INEX 2000, completed in 2001), and have just put together INEX 3. The first exercises dealt with the urgent early phase of an accident, within days of the occurrence of the release, concerned primarily with protecting people through such things as giving iodine, providing shelter, and evacuation. INEX 3, which should be carried out this year, will deal with the next and later periods and will focus on consequence management.

INEX 1, held in 1993, was devised by the NEA to study how various countries were planning to deal with nuclear emergencies, particularly looking at emergency communication, coordination, and response. The success of this table-top exercise led the CRPPH to develop a more ambitious and realistic exercise to study these aspects in more depth. INEX 2 involved four regional "command-post" exercises held between 1996 and 1999, each with 30 to 35 countries and three to five international organizations participating simultaneously in real time.

At the beginning of the INEX 3 exercise, the players will be confronted by a large-scale contamination resulting from some plausible scenario; one possible scenario is terrorist-related (using a crop duster to contaminate an area) and another is a fire at a nuclear facility. But the way the contamination occurs is not the point of the exercise, Lazo said. "The point is to deal with the resulting contamination. You start with very little information—you know it is large, but you do not know precisely where it is, or how much there is. So what do you do?

"The problems faced are very practical," he noted, "dealing with, for example, managing agriculture, controlling food distribution, and handling 'soft' issues such as travel and tourism. What countermeasures can you put in place? What sort of resources will be needed? You will have to make sure that everyone, particularly stakeholders, is informed and able to provide input to decision-making."

The NEA already has some interesting answers following a preliminary exercise run by the Finns in January, explained Lazo. They invited people from the food industry to participate. They were told that a few thousand hectares of land were contaminated, but that they should not worry because the contamination level was below the European Union's allowable limits and it would be no problem to eat the food. The food industry's loud response was, "Forget it. We are not going to buy any of the produce, because there are additional bequerels. We do not have to buy the stuff; we will get our supplies from somewhere else. We do not want your bequerels."

"So, despite all the effort and the countermeasures—intervention levels below which you do not have to do anything, put in place since Chernobyl—the feedback from consumers is that it was all a waste of time," Lazo said. "How do you handle those situations? These exercises should give some answers."

There are a lot of lessons to learn here, Lazo noted. "Certainly, when you move past the urgent phase of an event, things get more

complicated and decisions become more stakeholder-driven. It would seem that the input of radiological protection science, while important, becomes a smaller part of the decision-making process," he said.

This has led the committee to consider how radiological protection experts should interact with the affected populations and stakeholders. In this regard, a new study is under way on the Chernobyl accident, which marks its 20th anniversary next year. "It will focus on the interface between experts and the affected populations to see how we can most effectively bring our science and knowledge to address people's concerns and really make their lives better," Lazo said.

"Extracting lessons from what is going on now in the affected areas will help us be better prepared for dealing with contaminated areas in the future, particularly with regard to what professionals can really achieve to help those in the area," he said. "We also want to tie together the rehabilitation phase with the management of the early urgent phase because we think that they are all linked—that is, what you do at the beginning can affect your maneuverability later on."

The study will mainly address the day-to-day contribution of the local population and professionals to the rehabilitation of life in the contaminated territories. While clearly not all of this experience is applicable to other countries, much can be gained by studying the interaction of stakeholders with radiological protection specialists, Lazo observed, and the development of practical radiological protection approaches (a radiological protection culture) for all those living in a contaminated environment. According to Lazo, this should also yield a better understanding of the magnitude and variety of problems that would be posed by a large-scale contamination.

The ISOE program

Another important ongoing activity of the NEA is the Information System on Occupational Exposure (ISOE) program. Launched in 1992, ISOE is aimed particularly at helping radiation protection managers at nuclear power plants through the exchange of experience and data. The NEA recently published a report on what managers think is good practice in the optimization of radiological protection, taking into account the ICRP draft recommendations to make sure that the needs of staff working on the shop floor are addressed. The report has been sent to the ICRP, which said that it would take the points into consideration.

The ISOE program now includes the world's largest occupational exposure database and a network of utility and safety authority radiation protection experts for the exchange of experience, information, and lessons learned. Four ISOE technical centers (Europe, North America, Asia, and the International Atomic Energy Agency) manage the program's day-to-day technical operations. As of the end of 2004, 399 operating commercial nuclear reactors representing 91 percent of the world total are included in the database, as well as another 73 that are in cold shutdown or some stage of decommissioning. These reactors represent 70 utilities from 29 countries. Regulatory authorities from 26 countries participate in the program.

Three databases are included in the ISOE program:

- ISOE 1: Annual occupational exposure data.
- ISOE 2: Relevant plant characteristics, both static and annually modified.
- ISOE 3: Dose management experience: short descriptions plus contact person.

CRPPH ambitions continue

Lazo admitted that the CRPPH is very ambitious, using the resources available through the NEA to achieve as much as possible. "We have a very heavy program, for sure, over the next couple of years. I want to stress that it really is driven by the committee—the members tell us what they want and then they and their experts do the work. It is not something that the secretariat dreams up. The other driver is to make sure that the work will be useful to those in the field." NN