

# Radiological protection at the NEA: 50 years and thriving

T. Lazo\*

On 21 March 1957, the Steering Committee for Nuclear Energy of the Organisation for European Economic Co-operation (OEEC) created the Working Party on Public Health and Safety, the predecessor of the current NEA Committee on Radiation Protection and Public Health (CRPPH). In May 2007, the Committee celebrated 50 years of accomplishments and member service in a one-day, forward-looking event embedded within the Committee's 2007 annual meeting. The objectives were to recognise the achievements of the CRPPH, to identify potential emerging challenges for the radiological protection (RP) community as a whole, and to encourage an active dialogue among national regulatory and international organisations to identify new opportunities and approaches to address these challenges.

The event was attended by many of the Committee's past chairs and eminent members, as well as by several heads of regulatory authorities and high-level officials from international organisations. The day opened with a brief review of the Committee's history and achievements, and then focused on the future. With references to the Committee's recent report *Radiation Protection in Today's World: Towards Sustainability* (NEA, 2007), speakers highlighted emerging challenges and how national governments and international organisations could work together to pro-actively address them.

\* Dr. Ted Lazo ([lazo@nea.fr](mailto:lazo@nea.fr)) is principal administrator in the NEA Radiation Protection and Radioactive Waste Management Division.

## The CRPPH and its origins

The story of radiological protection at the NEA truly began with the creation of the Working Party on Public Health and Safety, almost a year before the creation of the OEEC European Nuclear Energy Agency itself. The Steering Committee for Nuclear Energy asked the Working Party to develop a programme of work in the area of radiological protection and public health and to establish a mechanism to implement it. That mechanism would be the Health and Safety Sub-committee (HSC), which was created on 21 February 1958 and renamed the Radiation Protection Committee before becoming the Committee on Radiation Protection and Public Health (CRPPH) in 1973.

The early days of the Working Party and the HSC marked the beginnings of international co-operation in the nuclear field. Common concerns quite naturally brought the main national public health authorities and specialists in radiological protection together in a standing forum with very broad competencies. Among those concerns were the potential consequences of atmospheric nuclear weapons tests, the prospects of developing nuclear electricity generation programmes and various applications of radioisotopes, set against a backdrop of early awareness of the need to protect people and the biosphere against the effects of radiation. These concerns gave way to numerous others over the Committee's history, including radiological protection norms and standards, radioactive waste disposal, nuclear emergency management, radiation biology and radiological protection science, and stakeholder involvement issues. The key radiological protection issues of each period (e.g. ICRP recommendations, sea dumping of radioactive waste, Chernobyl) can all be identified in

the Committee's programmes of work, which contributed to national governments' and international organisations' responses to these questions. In short, over the past 50 years the CRPPH has focused its work on the most pressing topics of the day, while simultaneously looking forward to identify possible new issues in a timely fashion.

### Key CRPPH accomplishments

Throughout its history, the CRPPH has actively examined the concepts and principles of radiological protection as well as their regulatory and operational application. The Committee has continually accompanied nuclear energy's development, even occasionally anticipating and judiciously acting to confront situations that have been difficult, or even dramatic. Examples like the Co-ordinated Research and Environmental Surveillance Programme (CRESP) and the work that was carried out to manage radioactive waste, as well as the Committee's work following the Chernobyl catastrophe, illustrate this and have undeniably influenced the orientations of the Committee.

The short list below highlights some of the most significant work that the CRPPH has done over its first 50 years.

#### Early RP standards

The CRPPH issued Radiation Protection Norms in 1959, 1963 and 1968 before abandoning this activity in favour of endorsing the norms of the European Union and of the International Atomic Energy Agency. The CRPPH continued, however, to issue recommendations in other areas, such as for the management of consumer products, gaseous tritium light devices, ionising chamber smoke detectors and cardiac pacemakers during the 1970s and into the 1980s. Again, this activity was gradually abandoned in favour of leaving standards development to other organisations.

#### Relationship with the ICRP

Throughout its existence, the CRPPH has collaborated with the International Commission on Radiological Protection (ICRP), initially through the review and assessment of newly issued ICRP standards, but more recently providing an active forum for dialogue with the ICRP during the development of new standards.

#### CRESP

Beginning in 1974, radioactive waste sea dumping operations by several NEA member countries had been carried out in a single site located in the North-East Atlantic. To fulfil the objectives of an

OECD Council Decision, an international group of oceanographic and radiological protection experts was convened by the NEA in 1979 to undertake a review of the continued suitability of the dumping site, taking into account the relevant provisions of the London Dumping Convention and the IAEA Definition and Recommendations for the purposes of the Convention. The Co-ordinated Research and Environmental Surveillance Programme, or CRESP, was subsequently initiated in 1981, with the objective to continue to strengthen the scientific and technical bases of future assessments of the North-East Atlantic dump site. This programme was carried out under Article 2(a)iii of the OECD Council Decision establishing a multilateral consultation and surveillance mechanism for sea dumping of radioactive waste. Sea dumping of radioactive waste ended in 1982, and the NEA's surveillance of the dump site was officially terminated in 1995.

#### Scientific reports

As a Committee of scientists as well as regulatory experts, the CRPPH has always performed scientific studies of highly appreciated quality. Over the years, the subjects addressed by the Committee have included:

- *Marine Radioecology* (1968);
- *The Radiological Significance and Management of Tritium, Carbon-14, Krypton-85 and Iodine-129 Arising from the Nuclear Fuel Cycle* (1980);
- *Environmental and Biological Behaviour of Plutonium and Some Other Transuranium Elements* (1981);
- *Dosimetry Aspects of Exposure to Radon and Thoron Daughter Products* (1985);
- *Gastrointestinal Absorption of Selected Radionuclides* (1998);
- *Developments in Radiation Health Science and Their Impact on Radiation Protection* (1998);
- *Scientific Issues and Emerging Challenges for Radiation Protection* (2007).

#### CRPPH collective opinions

The CRPPH played another role by preparing conferences and drafting the Committee's resulting "collective opinions", which were then submitted for international discussion. Examples include the collective opinions on *Radiation Protection Today and Tomorrow* (1994), *Developments in Radiation Health Science and Their Impact on Radiation Protection* (1998), *A Critical Review of the System of Radiation Protection* (2000), and *Radiation Protection in Today's World: Towards Sustainability* (2007).

## Stakeholder involvement

The appreciation of radiological protection decisions as “one part science, four parts social judgement” has grown slowly but surely among professionals, largely due to the CRPPH studying this issue as early as 1994. Through a series of three workshops held in Villigen, Switzerland, the CRPPH has helped to increase the understanding of where and when stakeholder involvement in radiological protection decisions is needed, and of approaches of how it can best be accomplished to increase the applicability and sustainability of decisions.

## The Information System on Occupational Exposure (ISOE)

Beginning in 1992, the NEA created a “club” of radiological protection experts from nuclear power plants and nuclear regulatory organisations in order to facilitate the exchange of data, experience and lessons learnt. Since that time, the ISOE occupational exposure database has become the largest in the world for nuclear power plants (including data from over 400 power plants around the globe), and the ISOE network has facilitated that exchange of exposure management experience such that, since 1992, occupational exposures have been cut in half.

## International Nuclear Emergency Exercises (INEX)

Particularly since the Chernobyl accident, nuclear emergency management has been a central topic for nuclear safety regulatory authorities. To assist NEA member countries in improving their capabilities in this area, the CRPPH established the Working Party on Nuclear Emergency Matters. A major source of experience and lessons for the Working Party has been the INEX exercises. Held in 1993 (INEX 1), from 1996 to 2000 (INEX 2), and in 2006 (INEX 3), this series of international exercises has allowed emergency response organisations to test and to improve their approaches, processes and procedures to address the international and national aspects of large-scale nuclear accidents.

## The Chernobyl accident

The CRPPH has published seven reports on the accident, assessing its impacts on NEA member countries as well as analysing lessons learnt in rehabilitation. The lessons from Chernobyl have significantly influenced the approaches adopted by the INEX programme.

## Future challenges in decision making

Advances in radiological protection science, increasing experience in implementing radiological protection and social evolution all condition the way in which radiological protection principles are interpreted and implemented. In reviewing the current situation, the CRPPH collective opinion of 2007 pointed out that the evolution in these areas will increasingly challenge our current approaches to radiological protection policy, regulation and application and will demand new perspectives and new thinking.

The need for new perspectives and thinking does not arise from any particularly significant change coming from science, experience or society. Rather, the smaller, incremental changes in these three areas as a whole suggest the need for change. It is possible to characterise how certain types of situations will be affected and will need to be viewed in order to provide the most appropriate radiological protection under the prevailing circumstances. In this context, the CRPPH has identified four key areas where new approaches will be needed. The first area, which reflects challenges at the policy and regulatory level, concerns the balancing of local, national and international needs in order to identify and implement sustainable radiological protection solutions. The second area, which relates to implementation challenges, concerns approaches to identify appropriate protection for workers and the public. The third area concerns the implementation of radiological protection principles in four specific circumstances: contaminated areas and materials; decommissioning and dismantling; medical exposures; and radiological emergencies and malevolent acts. The fourth area, which reflects the rapid expansion of radiation uses, concerns the maintenance of competence and the intergenerational transmission of knowledge.

## Scientific evolution

The capability to assess radiological risks continues to progress as a result of scientific research. Historically, the complexities of radiation biology and cancer genesis have required assessments to be based primarily on “macroscopic” epidemiological studies of exposed populations of humans, animals, insects and plants. However “microscopic” studies from modern cellular and genetic biology have significantly contributed to our knowledge of how humans and the environment react to exposures to various sorts of ionising radiation, and under different types of exposure situations. It is

a continuing challenge to bridge radiobiology and epidemiology studies of risk assessment to assist decision making concerning risk management in the face of scientific uncertainties.

Based on ongoing and recently published studies, the CRPPH has identified several key issues and emerging challenges to the scientific bases and application of the overall system of radiological protection. These key issues and scientific challenges are:

- the non-target effects of radiation exposure that challenges the universality of the target theory of radiation-induced effects;
- individual sensitivity effects on patients, workers and members of the public to provide adequate radiological protection;
- greater use of molecular epidemiology to further refine the dose-response curve;
- the adequacy of the concept of dose to estimates of risk as we learn more about biological processes in response to radiation exposure;
- radiological protection in medical exposures to optimise exposures;
- radiological protection of the environment to better understand possible effects and end points;
- the health impacts of malevolent actions using sources of radiation;
- the need to interface with other disciplines and international organisations to optimise resources and enhance collaboration.

These decision-making and scientific challenges found broad agreement during the CRPPH 50<sup>th</sup> Anniversary, reemphasising the need for the Committee, and other national and international organisations, to address these issues in a timely fashion. In addition, the senior regulators participating in the event as well as the senior representatives from several relevant international organisations (IAEA, ICRP, EC, UNSCEAR and IRPA) provided further input to the CRPPH as to where future challenges may lie, in particular:

- The safety-security interface, and the exchange of knowledge between radiological protection and security (and their synergies) needs to be enhanced, and the sustainability of safety and security infrastructures reinforced.
- Malevolent acts involving radioactive materials need further consideration in an emergency management context.
- The tracking and monitoring of transboundary radiation sources need to be upgraded, as well as the evaluation of national infrastructures.

- Specific training is needed for the radiological protection aspects of decommissioning.
- Clear roles and responsibilities should be established between the licensees and the regulator.
- The reduction of funds for radiological protection research and development (R&D) will impact the ability to protect in the future.
- Some attention needs to be accorded to the framework for the radiological protection of the environment.
- Early co-ordinated response actions are needed to prevent local incidents from escalating into large-scale emergencies. Lessons need to be captured and widely disseminated.
- The transport of radioactive materials raises several issues requiring international resolution, in particular the denial of shipments.
- There is a need for international organisations to enhance collaboration among themselves to ensure safety and quality through their activities.
- Medical exposures are increasing very rapidly, often effectively beyond the control of national regulatory authorities. There is a need to enhance radiation safety culture in the medical field.

## Conclusion

Routine can be a handicap for an organisation and often brings with it a corollary tendency towards self-satisfaction and even inward focus. For its part, the CRPPH has remained open-minded and attentive to its members' preoccupations, and beyond this, to those of many of radiological protection's other stakeholders. The Committee has organised itself so as to integrate and to anticipate, scientific, technical and even social, economic and political evolution into its work. As a result, the CRPPH has always been a trail-blazer in many areas of radiological protection, and is increasingly seen as providing the necessary link between authorities, radiological protection professionals and society. ■

## References

1. NEA (2007), *Radiation Protection in Today's World: Towards Sustainability*, OECD/NEA, Paris.
2. NEA (2007), *Fifty Years of Radiological Protection: The CRPPH 50<sup>th</sup> Anniversary Commemorative Review*, OECD/NEA, Paris.