

# Radiation and Transport Safety

## Objective

To achieve global harmonization and raise the levels of protection of people against radiation exposure and of safety and security of radiation sources, and to ensure that the Agency properly discharges its health and safety responsibilities with regard to its own operations.

## Radiation Safety Standards

The Radiation Safety Standards Committee (RASSC) was reconstituted for the 2005–2007 period with modified terms of reference that give more emphasis to the use of standards and sharing of the experience from their use.

## Safety and Security of Radioactive Sources

One section of the Code of Conduct on the Safety and Security of Radioactive Sources is devoted, inter alia, to the import and export of high activity radioactive sources. During 2005, the Agency provided assistance to Member States in the implementation of guidance on the import and export of radioactive sources. In this connection, the Agency held a meeting in Vienna in December where participants from 54 Member States — and observers from the European Commission, WCO, and the International Source Suppliers and Producers Association — shared experience in implementing the guidance.

An Agency conference on the Safety and Security of Radioactive Sources, held in Bordeaux in June–July 2005, recognized that safety and security are integral to effective and comprehensive regulatory structures for ensuring the continuous control of

radioactive sources, and noted that an adequate balance between confidentiality and information exchange was necessary. It also noted that many national and multinational efforts are taking place to regain and maintain control of vulnerable and orphan sources. There was recognition of the need to prevent illicit trafficking in, and inadvertent movements of, radioactive sources. The effective management of radiological emergencies involving radioactive sources also needed to be integrated into national strategies for the safety and security of radioactive sources.

Under the IAEA–Russian Federation–USA (“Tripartite”) Initiative to Secure and Manage Radioactive Sources, the Agency has been managing projects for the dismantling of disused sources and facilities (teletherapy machines, irradiators, etc.), and the transport of sources to secure storage. In 2005, projects were completed in Azerbaijan, Belarus, Kazakhstan and the Republic of Moldova.

The *International Catalogue for Sealed Radioactive Sources and Devices* was made available to nominated national focal points. By the end of 2005, the catalogue contained more than 12 000 entries on sealed sources, devices used for the applications of sealed sources, manufacturers and suppliers, as well as information on identifying orphan sources. The data are available to national focal points as well as to Interpol, Europol and the WCO.

## Radiological Protection of Patients

An increasing number of clinicians and doctors are using ionizing radiation in their work, though many have received no formal training in radiation protection. Figure 1 highlights the importance of training, information exchange and guidance in assessing dose and in emphasizing the scope for dose reduction. Since different applications require

### The Agency's Safety Standards

During 2005, the Agency published two Safety Guides in the radiation safety area:

- *Environmental and Source Monitoring for Purposes of Radiation Protection (RS-G-1.8)*;
- *Categorization of Radioactive Sources (RS-G-1.9)*.

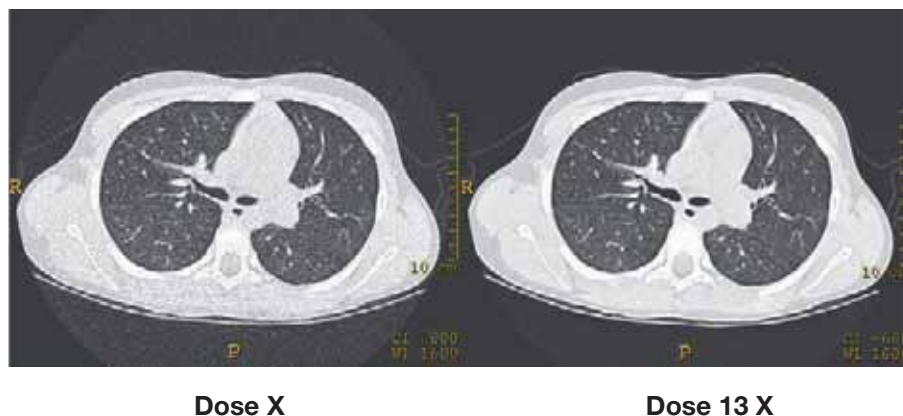


FIG. 1. Importance of training in widening the scope of dose reduction in the medical uses of radiation. While the two scans are of diagnostic quality, the scan on the right resulted in a dose that was 13 times higher than necessary.

different levels of image quality and radiation dose, it is important for clinicians to be aware of the need to use only the minimum dose for proper diagnosis. To address this issue, the Agency finalized training packages for radiation protection in diagnostic and interventional radiology, nuclear medicine and in radiotherapy. In addition, a third radiation protection training course was held for interventional cardiologists, since they have become major users of radiation techniques.

To facilitate wider dissemination, the Agency gave permission for its training packages to be placed on the web site of the International Organization for Medical Physics (IOMP). With four regional chapters and 74 national member societies, the IOMP reaches thousands of medical physicists worldwide. Some national IOMP member societies have also placed the material on their web sites.

## Occupational Radiation Protection

The Agency conducts intercomparisons of monitoring methods for assessing occupational exposure to assist its Member States in complying with dose limitation requirements and to harmonize the use of internationally agreed quantities and assessment methods. For example, the Agency was involved in a research project sponsored by the European Union that featured a worldwide intercomparison exercise, involving 81 laboratories in more than 40 Member States. The object was to assess the harmonization of dose estimation for intakes of radionuclides by workers through ingestion, inhalation or wounds. In addition, the Agency organized an exercise in the African region

to measure personal dose equivalent in photon fields.

## National Regulatory Infrastructures for the Control of Radiation Sources

Established in 2004, Radiation Safety and Security Infrastructure Appraisal (RaSSIA) missions provide Member States with a means to assess progress in establishing a national regulatory infrastructure for the safety and security of radioactive sources. In 2005, the Agency conducted 23 RaSSIA missions.

As part of its activities to assist Member States in establishing and operating their national regulatory programme, and in particular the national register of radiation sources, the Agency developed RAIS 3.0 (Regulatory Authority Information System), an information management tool for the day to day activities of regulatory bodies. At the request of several States, the migration of RAIS 3.0 to a more widely used data management program is under way.

Standardized packages were published for training staff involved in the regulatory control of radiation sources. These packages cover control of radiation sources in medical practices (radiotherapy, nuclear medicine and radiodiagnostics) and industrial practices (irradiators, industrial radiography, and nuclear gauges and well logging). A similar package was developed on the control of radiation sources in cyclotron facilities. In addition, a course on radiation safety for custom officers was developed with the WCO.

## Transport Safety

The Board of Governors approved a new policy for reviewing and revising the Regulations under which the Transport Regulations will be reviewed every two years. However, the decision on issuing a revision or publication will be made after assessment of the safety significance of the changes by the Transport Safety Standards Committee (TRANSSC) and the CSS. In this connection, TRANSSC was reconstituted for the 2005–2007 period with modified terms of reference, giving more emphasis on the use of standards and the sharing of the experience from their use. And the 2005 edition of the Transport Regulations was published by the Agency.<sup>1</sup>

The Agency has undertaken a number of activities to address the issue of denial of shipments of radioactive material intended for use in medical diagnosis and treatment. In July 2005, the Agency took part in the deliberations of the Facilitation Committee of IMO, and assisted in the preparation of a circular to IMO Member States aimed at facilitating the carriage of radioactive cargo prepared and forwarded in conformity with the applicable provisions of the International Maritime Dangerous Goods Code. The Agency also participated in a meeting of the Safety Panel of the International Cargo Handling Co-ordination Association in October 2005 to clarify issues related to the Agency's Transport Regulations.

The work of the International Expert Group on Nuclear Liability (INLEX) continued during 2005, with the Group agreeing on a number of conclusions and recommendations on possible gaps and ambiguities in the scope and coverage of the existing international nuclear liability instruments. Some of these conclusions and recommendations are addressed in a revision of the explanatory texts, which are now available in all official languages. It is expected that INLEX will continue to play an important role not only as a forum of expertise for discussions between shipping and coastal States but also in providing authoritative advice on the nuclear liability instruments adopted under Agency auspices.

In addition, in the context of INLEX's outreach activities, the first Regional Workshop on Liability

for Nuclear Damage was held in Sydney, from 28 to 30 November. The workshop was attended by 14 Member States in the Asia region and 12 non-members of the Agency who are members of the Pacific Islands Forum. A second regional workshop, for countries in Latin America, is scheduled to be held in Lima, Peru, in 2006.

A group of eight coastal and shipping States had informal discussions in Vienna, to which the Agency was invited, on communication between governments. The aim was to improve mutual understanding, confidence building and communication in relation to the safe maritime transport of radioactive material.

In 2005, the Agency updated its comprehensive training manual on transport safety to include the latest requirements of the Transport Regulations. A transport safety training course for Latin America was held in Lima in June. In December, the Agency conducted a Transport Safety Advisory Service mission to Japan. The mission report will be published in 2006.

## Responding to a Nuclear or Radiological Emergency

The Agency plays a key role in facilitating the sharing of knowledge and information between Member States from past emergencies in a form that allows them to quickly establish an effective capability to respond to a nuclear or radiological emergency. In 2005, guidance on the preparation, conduct and evaluation of exercises to test preparedness for a nuclear or radiological emergency and on medical response during an emergency were published.

Assistance is provided to Member States in their preparations to respond to a nuclear or radiological emergency. The current focus is on preparing 'first responders' (e.g. law enforcement, fire-fighters and public health officials) to respond effectively during the first few hours of a radiological emergency. In this connection, guidance and training material was prepared, jointly with other international organizations, which can be quickly adapted for use by first responders. This material was used to train first responders in Indonesia, after which an exercise to test the response to a radiological dispersal device was conducted (Fig. 2).

Another focus is on completing the set of generic and operational intervention levels on the basis of a new technical framework for criteria to be used

<sup>1</sup> INTERNATIONAL ATOMIC ENERGY AGENCY, *Regulations for the Safe Transport of Radioactive Material, 2005 Edition*, IAEA Safety Standards Series No. TS-R-1, IAEA, Vienna (2005).



FIG. 2. A medical team treating a simulated victim during a radiological emergency exercise in Indonesia.

during the response to a radiation emergency. This framework was published and discussed with Member States and other international organizations at a technical committee meeting.

## International Incident and Emergency Response System

A well organized emergency response system helps to build confidence that an emergency will be handled effectively. In accordance with General Conference resolutions and considering the new global challenges posed by the potential malevolent use of nuclear and radioactive material, the Agency established an Incident and Emergency Centre (IEC) in February. The IEC's goal is to enhance the capabilities of Member States and intergovernmental organizations to respond to nuclear or radiological incidents and emergencies by offering timely and efficient services. It provides a visible, reliable and accessible focal point for reporting and, if necessary, promptly supporting the response of Member States to such emergencies. It also provides for the exchange of information and sharing of knowledge for the purposes of early warning and prevention.

In 2005, the Agency was informed of 170 events involving or suspected to involve ionizing radiation. Of these, 137 events involved very low activity radiation sources and had no impact on the public or the environment. There were 14 events reported involving radiation sources used in radiography where exposure to workers exceeded regulatory

limits, another eight reported cases involving "dangerous" radiation sources and nine other events which occurred at nuclear facilities.

In 15 cases, the Agency was requested to provide assistance pursuant to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention), and in eight other cases the Agency offered its good offices. In four cases, the Agency either sent a fact-finding mission or facilitated multilateral or bilateral assistance and discussions among the parties involved.

The Agency enhanced its Early Notification and Assistance Conventions (ENAC) web site to offer users extended capabilities, including a training function. The system has proved to be effective not only during exercises, but in disseminating information received by the Agency on radiological emergencies and incidents.

## Strengthening the International Preparedness and Response System

In implementing the 2004 Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies, a Communication Work Group and an Assistance Work Group were established. In addition, draft documents describing the concept and strategy for achieving an internationally harmonized communications system and for enhancing international assistance for nuclear and radiological incidents and emergencies were prepared.

A major international exercise — ConvEx-3 (2005) — was held in May 2005. Based on a Romanian national exercise involving Unit 1 of the Cernavoda nuclear power plant, the scenario for the exercise was prepared by Cernavoda staff together with the Romanian National Commission for Nuclear Activities Control and the Inter-Agency Committee for Response to Nuclear Accidents. The Agency's participation in this exercise, through the IEC, fulfilled its obligations under the Convention on Early Notification of a Nuclear Accident (Early Notification) and Assistance Conventions (Fig. 3). Sixty-two Member States and eight international organizations participated in the exercise, which was successful in testing key systems that would be required in an actual emergency and in identifying opportunities for improvement. The exercise report was prepared and disseminated to all participants.



FIG. 3. IEC staff involved in ConvEx-3 (2005).

The third meeting of the representatives of competent authorities identified under the Early Notification and Assistance Conventions was held in Vienna in July 2005. The meeting reviewed progress and approved proposals relating to strategies for enhancing international assistance and international communication in the event of a nuclear or radiological incident or emergency, and reviewed the evaluation of ConvEx-3 (2005). Participants agreed on a proposal for enhancing the existing drill and exercise schedule, recommending that it cover all regions over a suitable time period, and that the exercises address both nuclear accidents and

radiological emergencies, including those arising from malicious acts. The meeting also encouraged competent authorities to initiate a request to develop a code of conduct for the international emergency management system.

## International Nuclear Event Scale

The International Nuclear Event Scale (INES) is used for facilitating rapid communication to the media and the public regarding the safety significance of events at all nuclear installations associated with the civil nuclear industry, including events involving the use of radiation sources and the transport of radioactive materials. More than 60 countries are currently participating in the INES Information Service. In 2005, the INES Advisory Committee assessed the latest developments, including pilot use of guidance for rating events involving radiation sources and their transport. The Committee recommended that the Agency reinforce training in the use of the scale. The Agency assists Member States, upon request, in organizing workshops to promote the INES methodology. In March, the Agency conducted a seminar in Point Lepreau, Canada, on the INES methodology for Canadian nuclear power operators, regulators and public information experts. ■