

RADIATION SAFETY

PROGRAMME OBJECTIVE

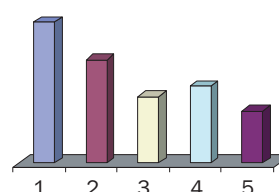
To promote radiation safety through the establishment of relevant safety standards, the application of these standards, the implementation of the Agency's radiation protection rules and requirements, as well as the provision of advice and services to Member States in the framework of the technical co-operation programme and the Convention on Early Notification of a Nuclear Accident and on Assistance in the case of a Nuclear Accident or Radiological Emergency.

OVERVIEW

The regulatory infrastructure for radiation safety continues to be a major area of work for the Agency. Peer reviews of national radiation safety infrastructure were conducted in a total of 24 Member States during 2000. Implementation of the action plan on the safety of radiation sources and the security of radioactive materials continued: a categorization system was agreed which will help national regulators prioritize their activities; an international Code of Conduct was agreed to encourage good practices in Member States; and an international conference provided an opportunity for national regulators to exchange information and experiences. The framework for response to radiological emergencies was upgraded to improve the Agency's capability to meet Member State information needs in the case of events not covered by the Early Notification Convention. The results of international intercomparison exercises completed in 2000 demonstrated the progress being made by national radiation monitoring services in countries participating in the technical co-operation Model Project.

Regular budget expenditure: \$3 394 319

*Extrabudgetary programme expenditure
(not included in chart): \$284 662*



1. Radiation Protection: \$1 083 924
2. Safety of Radiation Sources and Security of Radioactive Material: \$795 155
3. Safe Transport of Radioactive Material: \$513 855
4. Radiation Emergencies: \$597 696
5. Operational Services for Radiation Monitoring and Protection: \$403 689

RADIATION PROTECTION

A Safety Guide on radiation protection in medical exposure was approved. The publication provides Member States with guidance on national approaches and arrangements to facilitate compliance with the requirements of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. These arrangements include involvement of professional bodies in developing protocols related to the protection of patients to be implemented in medical institutions.

The Secretariat established a new service to review radiation safety regulatory infrastructures of Member States. This service is available to all Member States but is particularly

“... the Agency developed a simple, generally applicable system for categorizing radiation sources.”

aimed at States that do not have a nuclear power programme, and will therefore complement the International Regulatory Review Team (IRRT) service, which includes the regulation of radiation and waste safety but focuses on States that produce nuclear power. One peer review of this type was conducted in 2000, in Ireland. Peer reviews of the effectiveness of national radiation safety infrastructure were also conducted in China, Indonesia, Republic of Korea, Malaysia, Pakistan and Singapore.

A technical co-operation Model Project on upgrading radiation and waste safety infrastructures that has been providing assistance to 52 Member States ended in 2000. During the year, the Agency sent peer review missions to 17 participating States to evaluate progress towards reaching the first two Model Project milestones: a system of control for radiation sources and a monitoring system for occupational exposure. In all of the countries visited, good progress has been made and action plans

drafted to facilitate implementation of the project.

A CRP on radiation protection in diagnostic radiology ended in 2000. The primary objective was to initiate optimization programmes in the participating hospitals by introducing a quality control system for measurements, assessment of patient doses and image quality. Considerable reductions in patient dose were achieved without compromising image quality through simple and inexpensive actions such as added filtration, higher voltages, lower currents and the use of appropriate screen–film combinations. The CRP promoted awareness about practical implementation of quality control protocols and created a pool of expertise in each country in patient radiation protection. It also promoted close interaction and co-operation with the different professionals involved in health care delivery in a radiology department (darkroom technicians, radiographers, medical physicists and radiologists).

A CD-ROM with full search features was produced containing the full text of all of the Agency’s current safety standards relevant to occupational radiation protection: the Safety Fundamentals publication on radiation protection and the safety of radiation sources, the International Basic Safety Standards and three Safety Guides on occupational radiation protection. The CD-ROM is co-sponsored by the International Labour Office.

SAFETY OF RADIATION SOURCES AND SECURITY OF RADIOACTIVE MATERIAL

As part of its activities to implement the Action Plan on the Safety of Radiation Sources and the Security of Radioactive Materials — approved by the Board of Governors and endorsed by the General Conference in September 1999 — the Agency developed a simple, generally applicable system for categorizing radiation sources. The sources are ranked according to the harm they could cause, so that the controls to be applied will be commensurate with the radiological risks which the sources (and the materials

contained in them) present. The ranking is as follows:

- *Category 1 (higher risk)*: industrial radiography sources, teletherapy sources, irradiators;
- *Category 2 (medium risk)*: brachytherapy sources (with both high and low dose rates), fixed industrial gauges with high activity sources, well logging sources;
- *Category 3 (lower risk)*: fixed industrial gauges with lower activity sources

The Board of Governors and General Conference endorsed the system, and a technical document describing the ranking system has been published.

Another activity related to the implementation of the Action Plan was a conference of national regulatory authorities organized by the Agency and hosted by the Government of Argentina in Buenos Aires, in December 2000. High level officials, senior experts from national authorities and senior policy and decision makers exchanged views and experience on the administrative, technical and managerial aspects of ensuring the regulatory control of radiation sources and radioactive materials by national authorities. The problems of establishing an effective regulatory authority, supported by several government agencies in each State, and on the procedures for the effective control of radiation sources and radioactive materials were emphasized. In particular, the steps involved in generating a regulatory control system where it does not exist, preventing sources from ‘escaping’ from the control system and locating and regaining control over ‘orphan’ sources were discussed. The Conference produced 16 “major findings”, including a set of eight “immediate future actions” that States should take with a view to ensuring the safety and security of radiation sources. Many of the findings reinforced the activities already in the Agency’s Action Plan. Three of the further actions identified in the findings were:

- Consideration should be given to a universal system for the labelling of radiation sources in such a way that members of the public would immediately recognize them

as hazardous (using symbols and/or text in the local language). The Conference noted that the trefoil symbol used to identify radiation sources was not sufficient warning of the hazard and was often not recognized;

- Measures to prevent criminal misuse of radiation sources should be seen as complementary to measures to increase their safety and security. A distinction

“... the steps involved in generating a regulatory control system where it does not exist, preventing sources from ‘escaping’ from the control system and locating and regaining control over ‘orphan’ sources were discussed.”

should be made between, on the one hand, criminal activities involving an intent to expose people to radiation and, on the other hand, breaches of safety and security where there is no malicious intent. This distinction has implications for border monitoring in particular; and

- States should develop proactive national strategies for locating orphan sources, including actions to bring orphan sources or vulnerable sources (e.g. those in inadequate storage) under proper control.

The Agency prepared a Code of Conduct on the Safety and Security of Radioactive Sources. The General Conference, in Resolution GC(44)/RES/11, invited Member States “to take note of the Code of Conduct” and “to consider, as appropriate, means of ensuring its wide application”. The objective of the Code is to achieve and maintain a high level of safety and security of radioactive sources through the development, harmonization and enforcement of national policies, laws and regulations, and through the fostering of international co-operation. In particular, it addresses the establishment of an adequate system of regulatory control from the production of radioactive sources to their final disposal, and a system for the restoration of such control if it has been lost.

An international reporting system for unusual radiation events (RADEV) was developed under the Action Plan and underwent internal trials. External trials will be carried out in 2001. The database will contain summaries of reports giving the results of detailed reviews of the causes and consequences of serious radiological accidents and the lessons learned. The system provides a narrative of each event and allows data to be sorted by practice, type of source, the people exposed, if any (workers, patients or public), the outcome (deterministic effects if any) and cause.

A Safety Report was issued on lessons learned from accidental exposures in radiotherapy. The report includes descriptions of 92 events,

“The Agency, in co-operation with other relevant international organizations and Member States, upgraded its system for responding to radiation emergencies.”

their causes and the remedial actions taken, and an analysis of lessons learned and measures for the prevention of accidents. This information is aimed at encouraging professionals working in radiotherapy facilities to consider whether such events could occur in their facilities and how they can be prevented.

SAFE TRANSPORT OF RADIOACTIVE MATERIAL

The process for producing the next substantive revision of the *Regulations for the Safe Transport of Radioactive Material* started, with a target date of 2003 for publication of a new edition. Member States and international organizations provided more than 200 proposals for change. These were placed on the Agency’s Web site, together with standard electronic forms to provide comments on the “proposed changes” and “identified problems”. The Revision Panel reviewed and acted upon the proposals.

At the request of the General Conference, the Secretariat conducted a survey among Member States on the national implementation of the Agency’s Transport Regulations. A questionnaire was sent to all Member States and responses were received from 72, including all 30 States with operating nuclear power plants. Of those responding, 60 indicated that their national systems for regulating domestic and international transport of radioactive material were based on the Agency’s regulations and, in addition, about a dozen (11 for domestic transport, 13 for international) were already based on the most recent (1996) edition.

In December 1998, the United Nations Committee of Experts on the Transport of Dangerous Goods approved complete integration of the requirements of the Agency’s Transport Regulations into the United Nations Recommendations on the Transport of Dangerous Goods (also known as the ‘Model Regulations’). In 2000, the Agency, the International Civil Aviation Organization, the International Maritime Organization and the Inland Transport Committee of the UN Economic Commission for Europe agreed on a timetable for entry into force in 2001 of new transport-mode-specific regulations consistent with the Model Regulations (and hence with the Agency’s 1996 edition of the Transport Regulations).

During 2000, two requests for Transport Safety Appraisal Service missions were received from Brazil and Turkey. A pre-mission visit to Brazil was completed, and efforts are under way to schedule these two missions during 2001.

RADIATION EMERGENCIES

The Agency, in co-operation with other relevant international organizations and Member States, upgraded its system for responding to radiation emergencies. The existing notification system focused on transboundary emergencies of the type specified in the Convention on Early Notification of a Nuclear Accident (only one of which had occurred since the Convention entered into force). However, with

recent events such as the criticality accident at Tokaimura in Japan, accidents in Thailand, Peru and Turkey involving orphan sources, the Acerinox incident of 1998 in Spain, and the fact that the Agency is frequently asked by official contact points to verify reports of ongoing events, it has become clear that official requests for information on such events are within the scope of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. Member States were therefore encouraged to report to the Agency, in the form of 'warning messages', information about emergencies that were outside the scope of the Notification Convention but that might nevertheless be of concern to other Member States. The Agency will then convey such messages as appropriate to all Member States and post such messages on a Web site. To facilitate this procedure, the Agency issued a completely new edition of the *Emergency Notification and Assistance Technical Operations Manual*, together with performance requirements for an Emergency Response Network and, with FAO, OECD/NEA, United Nations Office for the Coordination of Humanitarian Affairs, WHO and WMO, prepared a Joint Radiation Emergency Management Plan of the International Organizations.

Following a fatal accident involving a cobalt-60 radiotherapy source in a suburb of Bangkok, the Thai authorities requested assistance from the Agency under the terms of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. A team, comprising two radiation protection experts from the Agency and three Japanese doctors specializing in the treatment of radiological accident victims, went to Thailand to advise the Thai authorities.

In recent years, the Agency has provided assistance to Georgia in dealing with 'orphan' radiation sources in the country. In May–June 2000, an Agency mission, supported by the Commissariat à l'Énergie Atomique in France, carried out an aerial radiological survey of about 1200 km² of Georgian territory, focusing on centres of population and areas with abandoned military bases. One caesium-137 source was located in Poti, western Georgia, and

three other areas with slightly elevated radiation levels were identified for further investigation by the Georgian authorities.

A common feature of some recent events involving 'orphan' sources has been the initial misdiagnosis by physicians of the symptoms of acute radiation exposure, leading to delays in response and unnecessary exposure. In an effort to raise awareness and knowledge, the

“The Agency is required by its statute to provide for the application of safety standards.”

Agency and WHO jointly issued a leaflet for physicians and hospital emergency departments on recognizing and initially responding to an accidental radiation injury. The Agency also issued a technical document containing practical procedures for assessment and response to radiological emergencies.

OPERATIONAL SERVICES FOR RADIATION MONITORING AND PROTECTION

The demand for radiation monitoring and protection services for Agency staff and technical co-operation experts continues to increase. In 2000, the Secretariat provided monitoring for almost 500 staff on a regular basis and a further 700 technical co-operation experts and trainees on an ad hoc basis.

The Agency is required by its statute to provide for the application of safety standards. A basic prerequisite is the ability to monitor radiation exposure accurately and consistently, and hence there is a need to harmonize the use of dosimetric quantities and techniques in Member States. To this end, the Agency completed two international intercomparisons: one on measurements of personal dose equivalent and the other on measurement of activity in bioassay samples. Two

regional Asia–Pacific intercomparison exercises were also carried out: one covering the determination of ambient dose equivalent from measurements with survey equipment used in radiation protection and one on the measurement of activity of radionuclides in food and environmental samples. In these intercomparisons, monitoring services in more than ten Member States receiving Agency assistance under the technical co-operation

Model Project on upgrading radiation protection infrastructures obtained results that were considered excellent, given the status of those Member States' infrastructures when the Model Project started. This is an indication both of the success of the Model Project in helping to improve safety infrastructure and of the value of intercomparison exercises in helping monitoring services to identify their strengths and weaknesses.