

# Management of Radioactive Waste

## Objective

To increase global harmonization in the policies, criteria, standards and provisions for their application, as well as in methods and technologies, for achieving safety in radioactive waste management, in order to protect humans and their environment against potential health effects attributable to actual or potential radiation exposure to radioactive waste.

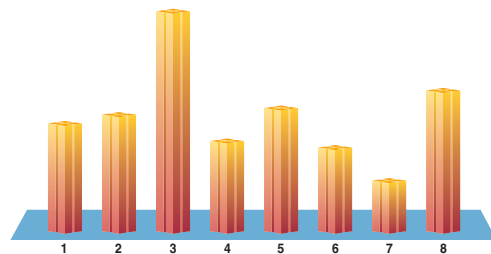
## Key Issues and Highlights

- Safety standards were published on the management of waste from the mining and milling of radioactive ores.
- Two international conferences were held, one on 'Safe Decommissioning for Nuclear Activities', in Berlin, and the other on 'Issues and Trends in Radioactive Waste Management', in Vienna.
- Reports were published on technologies for the management and disposal of waste and disused sources, and on the safety, institutional and non-technical aspects of decommissioning and site remediation.
- An 'Indicator of Sustainable Development for Radioactive Waste Management' was developed.
- A *Radioactive Waste Management Registry* was developed and the software package made available to Member States.

## Radioactive Waste Safety Standards and Provisions for their Application

The Secretariat was requested by the General Conference in 2000 "to develop...radiological criteria for long-lived radionuclides in commodities, particularly foodstuffs and wood". It was decided to approach this issue via a broader solution covering this and a number of related issues. Member State experts agreed in February 2002 on a draft Safety Guide that includes a set of criteria in the form of levels below which materials are considered to be outside the scope of regulation. The Secretariat has revised the draft to take account of the comments from the Agency's Radiation Safety Standards Committee and the Waste Safety

Regular budget expenditure: \$5 495 914  
Extrabudgetary programme expenditure (not included in chart): \$928 685



1. Radioactive Waste Safety Standards and Provisions for their Application: \$633 538
2. Safety of Disposable Radioactive Waste: Managing Non-Reusable Radioactive Materials and Arranging for their Disposal: \$678 106
3. Technologies for Disposable Radioactive Waste Management: \$1 283 170
4. Safety of Dischargeable Radioactive Waste: Protection of the Public and the Environment: \$582 251
5. Safety of Residual Radioactive Materials: Termination of Practices, Decommissioning of Installations and Restoration of Sites: \$714 573
6. Technologies for the Decommissioning of Installations and Restoration of Sites: \$490 163
7. Management of Disused Sealed Radioactive Sources: \$291 620
8. Radioactive Waste Management Information: \$822 493

Standards Committee (WASSC) and from Member States, but agreement has not yet been reached.

Progress on safety standards for the geological disposal of waste continued, with the OECD/NEA agreeing to co-sponsor the Safety Requirements publication. In 2002, WASSC approved the framework for related safety guidance and is expected to approve a draft of the Safety Requirements in March 2003 for submission to Member States.

## Safety of Disposable Radioactive Waste: Managing Non-Reusable Radioactive Materials and Arranging for their Disposal

The Agency has a programme of work based on conclusions and recommendations from the 2000 Córdoba conference on the safety of radioactive waste management. The programme highlights seven actions, including assessment of the safety implications of the

extended storage of radioactive waste and development of a work programme aimed at addressing the broader social dimensions. A document on long term storage was completed and will be published as an 'international position paper' in 2003. In addition, work commenced on evaluating the generic safety of long term storage through the application of safety assessment methods.

An international conference on 'Issues and Trends in Radioactive Waste Management' was held in Vienna in December, in co-operation with the European Commission and the OECD/NEA. One of the main findings was the wider recognition of the crucial importance of public acceptance of waste management practices, and a resulting increase in emphasis on non-technical, societal issues and on dialogue with a wide range of stakeholders. The conference findings will be used by the Agency to fine-tune the programme of work described above.

The final report of a CRP on the 'Improvement of Safety Assessment Methodologies for Near Surface Disposal Facilities for Radioactive Waste' (ISAM) was completed in 2002. Having developed the methodologies through the ISAM project, the Agency then initiated a follow-up CRP on the 'Application of Safety Assessment Methodologies for Near Surface Waste Disposal Facilities' (ASAM). This project will address safety reassessment and disposal of disused radiation sources and mining waste, together with the regulatory review of safety assessments.

Considerable efforts have been made on the safe disposal of spent sealed sources. A technical document was prepared on the safety of their disposal in borehole facilities, and a related report addresses the use of safety assessment in determining waste acceptance criteria for near surface disposal facilities. In addition, a safety report on surveillance and monitoring for near surface disposal facilities was completed.

Ten training courses and workshops on the safety of radioactive waste management were held during the year. The training covered all aspects of waste management and disposal, with a number of specialist courses in safety assessment for disposal facilities.

## **Technologies for Disposable Radioactive Waste Management**

To facilitate international co-operation and promote consensus on geological disposal, the Agency

established in 2001 a network of centres of excellence for training in and demonstration of waste disposal technologies in underground research facilities (URFs). Discussions in September 2002 between the Agency, the network members and potential users of the URFs resulted in the establishment of a proposal and work plan for an interregional technical co-operation project that includes training on site characterization techniques and co-ordinated research activities.

A recently published report describes institutional and financial arrangements in 20 Member States considering different options for the long term management of HLW and/or spent nuclear fuel (SNF). Information is provided on the amounts of HLW and SNF expected to be generated and on expectations concerning geological repositories.

With the aim of facilitating information exchange between the scientific community and the public, the Agency developed a multimedia CD-ROM that explains the current internationally accepted views on the concept of geological disposal of radioactive waste. The CD-ROM is aimed at responsible authorities, politicians, opinion leaders, the interested public and organizations in Member States.

A regional technical co-operation project for the East Asian region on the near surface disposal of radioactive waste from non-power applications was completed and a project report issued. The project helped participating States identify suitable repository concepts for their national programmes and supported the establishment of a regional forum for sharing experience on methods for assessing the associated safety issues.

## **Safety of Dischargeable Radioactive Waste: Protection of the Public and the Environment**

International interest in the protection of the environment against ionizing radiation has grown rapidly in recent years. A technical document published in 2002 describes the different ethical considerations in protecting the environment and interfaces them with the scientific and legal background in order to derive a firmer basis for policy making with respect to radiation and the environment. This work, and responses to the discussion document, will form one input into the development of safety standards in this area.

In July, the Agency co-operated with Environment Australia and the Australian Radiation Protection and Nuclear Safety Agency in organizing a symposium in Darwin on the protection of the environment from ionizing radiation. The discussions concluded that a credible, systematic, international approach to the protection of the environment is needed to meet the commitments of Member States. Moreover, this mechanism should be transparent, flexible, and consistent with the approaches applied to other environmental stressors and with the principles for the radiological protection of humans.

### **Safety of Residual Radioactive Materials: Termination of Practices, Decommissioning of Installations and Restoration of Sites**

A Safety Guide on the *Management of Radioactive Waste from the Mining and Milling of Ores* was published. Waste from mining and milling activities contains only low concentrations of radioactive material but it is generated in large volumes in comparison with waste from other facilities. The Guide provides recommendations for managing this waste in a manner consistent with the 1999 Safety Requirements publication on the near surface disposal of radioactive waste. A related Safety Report that elaborates on the recommendations set out in the Safety Guide, *Monitoring and Surveillance of Residues from the Mining and Milling of Uranium and Thorium*, was also published in 2002.

A large number of nuclear installations around the world are currently being considered for decommissioning. A Safety Report on *Safe Enclosure of Nuclear Facilities During Deferred Dismantling* was published to help Member States ensure that a nuclear installation that will be or has been placed in a safe enclosure mode is maintained in a safe state until the final dismantling is performed and the facility or site is released from regulatory control.

This issue was also addressed at an international conference on 'Safe Decommissioning for Nuclear Activities', held in Berlin in October 2002. Three of the main findings from this conference concerned the importance of early and systematic planning for decommissioning and of adequate funding for decommissioning, and the continued lack of internationally accepted criteria for the release of materials and sites from regulatory control in the course of decommissioning.

In February, at the request of the Kuwaiti Government and in co-operation with UNEP and WHO, the Agency organized a sampling campaign in Kuwait covering 11 sites identified in 2001 as having been affected by depleted uranium residues. A report on the results of the sampling is scheduled to be completed in 2003.

### **Technologies for the Decommissioning of Installations and Restoration of Sites**

A report published in 2002 addresses record-keeping aspects of the decommissioning of nuclear facilities. Published information and guidance on this topic are relatively scarce compared with the coverage of technological aspects of decommissioning. Lack of proper attention to recordkeeping may result in a waste of resources and can also lead to safety problems.

Experience has shown that progress in remediating sites with radiological contamination from sources such as mining and milling, past practices or accidents often depends on societal conditions. This problem was addressed in a report published in 2002 on non-technical factors influencing decision making in environmental remediation. The factors that need to be considered include the sociocultural and socioeconomic contexts, funding sources and availability of funds, public perception and stakeholder issues.

A recently completed technical co-operation project in Ukraine focused on the establishment of plans and infrastructure for the decommissioning of Ukrainian WWER plants. Particularly important is the establishment of a financial mechanism to collect decommissioning funds. Major project achievements include the setting up of a national network of all parties active in decommissioning planning, and the release of a decommissioning strategy document advising the Ukrainian decision makers on viable decommissioning strategies.

Another technical co-operation project, in Latvia, achieved a significant milestone with the testing and commissioning of a cementation plant for liquid waste. This plant is intended to serve the needs of a decommissioning project at the Salaspils research reactor near Riga.

### **Management of Disused Sealed Radioactive Sources**

Disused sealed radioactive sources present a significant waste management challenge in many

developing Member States. During 2002, the Agency assisted Colombia, the Dominican Republic, Kuwait, Morocco and Singapore in rendering national inventories of spent radium sources safe. In addition, a special operation was carried out in Thailand where a high activity cobalt-60 source was conditioned for long term storage without the use of a hot cell. Another conditioning operation, involving an americium-241 source used as a static eliminator, was conducted in Ethiopia.

To help build capacity in Member States, a report on the management of spent high activity radioactive sources was published and a document on the conditioning of long lived sealed radioactive sources is being finalized. Generic technical procedures for conditioning high activity and long lived sources were also developed during 2002.

An important activity involves the assessment of disposal options for disused radioactive sources. For developing countries that use only a limited range of nuclear applications involving a relatively small number of sealed sources, the cost of disposing such sources may be prohibitive. An African regional technical co-operation project demonstrated the technical feasibility of the borehole concept for the disposal of disused radiation sources. This could provide a safe and cost effective disposal option for developing countries.

## **Radioactive Waste Management Information**

A new Web page provides public access to reports from the Agency's Net Enabled Waste Management Database (NEWMDB), to consolidated radioactive waste inventory reports and to the series *Radioactive Waste Management: Status and Trends*. The page also acts as a Web portal to Agency documents and reports

in the field of radioactive waste management (see <http://www-newmdb.iaea.org/reports.asp>).

In February 2002, development of an 'Indicator of Sustainable Development for Radioactive Waste Management' (ISD-RW) was completed. This provides a measure of both the current status of waste management in a Member State and progress made towards the sustainability of management. The measure can be used at the national level or for a particular sector, for example medical and industrial applications. The ISD-RW was submitted to the United Nations in November for inclusion in its list of core indicators. Information on the development and use of ISD-RW is available via e-mail ([ISD-RW@iaea.org](mailto:ISD-RW@iaea.org)).

The Agency's *International Catalogue of Sealed Radioactive Sources and Devices* has been further developed, and now includes basic technical data, design features and illustrations for more than 2800 radioactive source models and 400 devices, as well as the address and company history of more than 990 manufacturers and distributors. It has been used to respond to a number of requests from Member States for the identification of sources.

The *Radioactive Waste Management Registry* was finalized and the software package made available to Member States on request. The registry is a managerial tool for recording and reviewing information on all types of radioactive waste, from generation to disposal, and provides an overview of the various steps involved in waste management.

A new project on the management of radioactive waste provides hands-on training to Member States on various quality assurance practices and procedures, which are integrated into waste management systems. The first training session was carried out at the Malaysian Institute for Nuclear Technology Research in August. Similar training will be carried out for the Latin American and European regions in the future.