

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 health effects attributable to actual or potential exposure to radioactive waste.

Protecting the Public and the Environment

There are clear international standards for controlling releases to protect the public and, according to UNSCEAR estimates, doses to humans from these such releases are negligible. However, public attention is now being focused on protecting non-human biota. Although radiation effects on biota have been studied, the existing international guidance on radioactive discharge control and intervention does not contain explicit recommendations on biota protection. At an international conference on the Protection of the Environment from the Effects of Ionizing Radiation, held in Stockholm in 2003, a framework for protecting non-human biota was established. As a follow up, a number of consultations were held during 2004 for drafting an international action plan on the radiation protection of the environment.

In related work, the Agency set up a project on Environmental Modelling for Radiation Safety (EMRAS). This project will evaluate and optimize the various models of radioactivity transfers from a nuclear source to a member of the public or biota.

The United Nations Chernobyl Forum is an Agency project related to the implementation of the 2002 UN system-wide initiative known as the 'Human Consequences of the Chernobyl Nuclear Accident – A Strategy for Recovery'. Under the framework of this initiative, the Agency organized three meetings of the forum and five meetings of an Expert Group on the environment. In parallel, WHO held a series of meetings of their Expert Group on health. The Forum's technical report was completed in 2004 and submitted for comments to Forum

participants, after which it will be discussed at the April 2005 meeting of the Forum. An international conference entitled 'Chernobyl: Looking Back to Go Forward' is also planned for September 2005.

Safety of Radioactive Waste Management and Disposal

In 2004, the General Committee for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management reviewed the experience of the First Review Meeting and recommended improved arrangements for adoption by the next meeting of Contracting Parties in 2006.

Work continued on implementing the Action Plan on the Safety of Radioactive Waste Management – approved by the Board of Governors in 2000 and revised in 2003. For example, the Agency and OECD/NEA held meetings on co-sponsoring international safety standards for geological disposal.

Member States are making increasing use of the internationally harmonized safety assessment approach developed within the ISAM¹ project to review the safety of low and intermediate level waste disposal facilities. Applying this methodology to a number of older facilities in Eastern Europe has identified problems with the disposal of long lived and high activity sealed sources in some facilities.

In December 2004, the Agency held an international symposium on the Disposal of Low Activity Radioactive Waste, in Cordoba, Spain, as a forum to discuss policies and strategies for low level waste management. One of the main findings at the symposium is that the Agency classification scheme should be revised to be more closely linked to an overall scheme for managing all types of radioactive waste in which each waste type is identified with a suitable disposal route.

Safety Reports Series No. 35, *Surveillance and Monitoring of Near Surface Repositories for Radioactive Waste*, was published in 2004. It provides Member States with advice and examples of good practices in relation to surveillance and monitoring programmes for near surface disposal facilities.

¹ 'Improvement of Safety Assessment Methodologies for Near Surface Disposal Facilities for Radioactive Waste' (an Agency CRP that ran from 1997 to 2000).

A report on the *Implications of Partitioning and Transmutation in Radioactive Waste Management* (Technical Reports Series No. 435) was published. Focusing on the radioactive waste aspects of partitioning and transmutation, the publication provides technical information for decision makers on the possible long term consequences of current decisions in managing waste.

The final report of a CRP on the long term behaviour of low and intermediate level waste packages under repository conditions was published as IAEA-TECDOC-1397. The CRP helped promote R&D on waste package performance, as well as facilitating information exchange in this area.

In smaller countries without a large legacy of wastes, the concept of regional repositories is appealing. An Agency publication, *Developing Multinational Radioactive Waste Repositories: Infrastructural Framework and Scenarios of Cooperation* (IAEA-TECDOC-1413), reviews various aspects of such repositories for Member States interested in sharing disposal facilities for radioactive waste and/spent fuel.

Decommissioning

In June 2004, the Board of Governors approved an action plan on the decommissioning of nuclear facilities. One of the first activities completed under the Plan was the publication of a special report on the *Status of the Decommissioning of Nuclear Facilities*

around the World. This report seeks to quantify the level of effort that will be required by the industry in order to safely carry out the necessary decommissioning tasks. As shown in Fig. 1, the total cost of decommissioning all types of nuclear facilities is approximately \$1 trillion over the period 2001–2050.

A point of concern has been the lack of internationally acceptable standards for the release of material from regulatory control following decommissioning activities. In September 2004, the Agency – along with the European Commission – co-sponsored an OECD/NEA workshop hosted by the Nuclear Plant Management Company, in Italy, and the Italian Agency for Environmental Protection and Technical Services on *Safe, Efficient and Cost-effective Decommissioning*. The participants noted that the IAEA Safety Standards Series publication *Application of the Concepts of Exclusion, Exemption and Clearance* (RS-G-1.7), now provides this guidance.

Safety Reports Series No. 36, *Safety Considerations in the Transition from Operation to Decommissioning of Nuclear Facilities*, and Technical Reports Series No. 420, *Transition from Operation to Decommissioning of Nuclear Installations*, were published in 2004. These reports support and extend the recommendations given in the Agency’s Safety Guides. They highlight technical, management and organizational issues arising during the transition period from operation to decommissioning, and provide guidance to minimize delays and undue costs, optimize personnel and

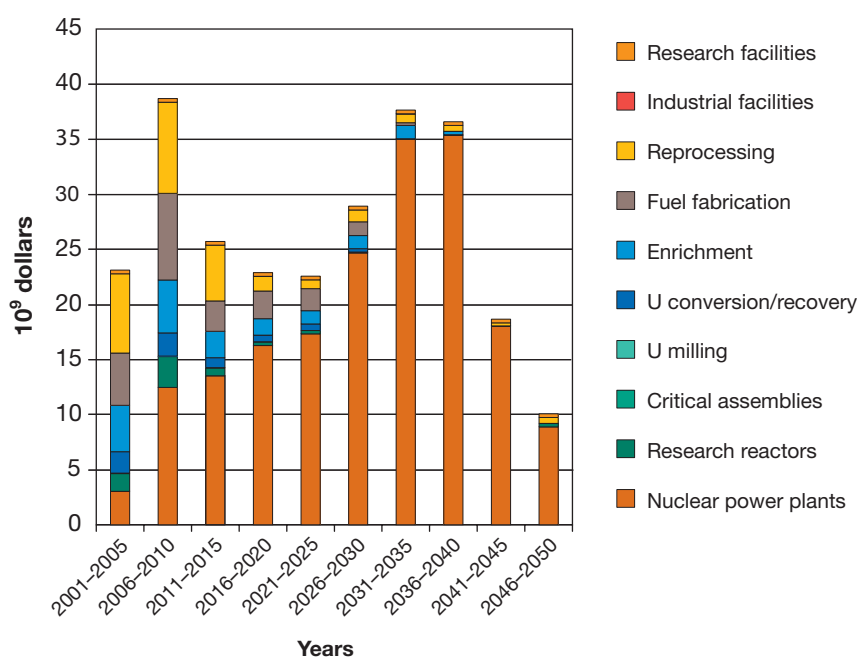


FIG. 1. Decommissioning costs for different types of nuclear facilities over the period 2001 to 2050.

other resources, and initiate preparatory activities for decommissioning.

Many organizational and management needs arise during the course of decommissioning projects. A technical document published in 2004, *Planning, Managing and Organizing the Decommissioning of Nuclear Facilities: Lessons Learned* (IAEA-TECDOC-1394), presents the major issues and practical experience gained in the decommissioning of some large scale nuclear installations.

Restoring Contaminated Sites

Parts of the surface environment in a number of Member States have been contaminated with radioactive residues. Contamination of the environment has also been caused by existing nuclear practices. The affected areas and sites range in size from small areas within industrial premises to large mill tailings piles and weapons test sites that cover hundreds of square kilometres. The Agency is leading an initiative, together with the OECD, EBRD and the World Bank, to assist a number of countries in central Asia in restoring uranium mining and milling sites in their territory. The Agency is also working with the Kazakhstan Government, the European Commission and NATO to identify the remaining radiological concerns at the former nuclear weapons test site at Semipalatinsk. In another mission, the Agency completed a preliminary assessment of the radiological conditions at the former French test sites at In Ekker and Reggane, in Algeria.

Safety Assessment Projects

In 2004, the intercomparison of safety assessment methodologies was extended with the establishment of a new project known as Safety Assessment Driving Radioactive Waste Management Solutions. The goal of this project is to examine different approaches

to the safety assessment of activities involving the predisposal of radioactive waste, including waste conditioning and storage.

Another project initiated in 2004 — Evaluation and Demonstration of the Safety of Decommissioning of Nuclear Facilities — aims to develop a harmonized methodology for evaluating and demonstrating safety during decommissioning and to produce model safety assessments for selected nuclear facilities by applying this methodology.

Radioactive Waste Management Services

At the request of the Australian Government, the Agency undertook an international peer review of the licence application submitted by the Australian Department of Education Science and Training to develop a near surface radioactive waste disposal for low level and short lived intermediate level waste. The Agency's international review team used the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the international radioactive waste safety standards as the basis for its assessment. The team concluded that the process of site selection has been thorough and that the selected site offered good prospects of meeting internationally endorsed safety objectives and criteria. However, further work was considered necessary to demonstrate safety before regulatory approval of construction and operation of the facility.

The Agency conducted a mission to review the Czech Radioactive Waste Repository Authority's Deep Geological Repository Development Programme. During the course of the mission, the team of experts met with the authority's senior management and its Board, plus representatives from the Ministry of Trade and Industry and various stakeholders involved in the siting process. ■