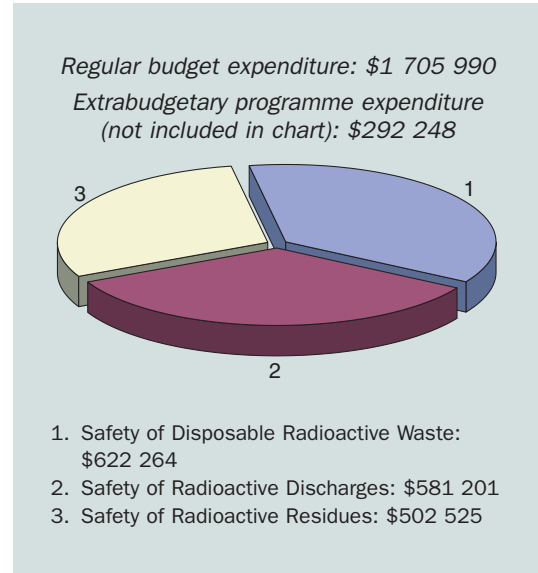


RADIOACTIVE WASTE SAFETY

PROGRAMME OBJECTIVE

To establish safety standards covering the management of solid radioactive wastes, the control of discharges of radioactive materials into the environment, and the restoration of environments with radioactive residues from past events and activities; to provide for the application of those standards through support for the Agency's technical co-operation programme; to service the London Convention 1972 and the Joint Convention; and to support the Global Programme of Action for Protection of the Marine Environment from Land-based Activities.



KEY ISSUES AND HIGHLIGHTS

- Safety standards were published on the decommissioning of nuclear fuel cycle facilities, and progress was made in the establishment of new consensus standards on geological disposal.
- Recommendations from the Agency's international conference on the safety of radioactive waste management, held in 2000 in Córdoba, Spain, were incorporated into the Agency's work plan for the future.
- Together with the OECD NEA, the Agency organized a peer review of the performance assessment being developed for a proposed waste disposal site at Yucca Mountain, in Nevada, USA.

SAFETY OF DISPOSABLE RADIOACTIVE WASTE

A specialists meeting in June on the geological disposal of radioactive waste addressed a number of topics on which consensus still needs to be developed so that Agency safety standards on the subject can be finalized. These included: a common framework for radioactive waste disposal; demonstrating compliance with safety criteria; safety indicators (in addition to dose and risk); reference critical groups and biospheres; assessment of human intrusion; reversibility and retrievability; and monitoring and institutional control. The meeting helped to clarify and document the areas of agreement that could be reflected in safety standards, and the outstanding issues.

At the request of the General Conference in 2000, the Agency prepared a report assessing the implications of the conclusions and recommendations from a 2000 conference on the safety of radioactive waste management on the Agency's programme of work. The report was finalized by taking account of comments during the March 2001 session of the Board of Governors and consultations with Member States, and was endorsed by the General Conference in September. The report highlights seven actions: develop a common framework for the disposal of different types of radioactive waste; assess the safety implications of the extended storage of radioactive waste; promptly develop safety standards for geological disposal; develop an internationally accepted and harmonized approach for controlling the removal of materials and sites from the regulatory system; develop a programme to ensure adequate application of the Agency's waste safety standards; explore ways to ensure that information, knowledge and skills concerning radioactive waste management are made available to future generations; and develop a programme of work aimed at addressing the broader social dimensions of radioactive waste management.

Following its peer review of the biosphere component of the United States Department of Energy's (DOE's) performance assessment of the planned high level waste repository at Yucca Mountain, Nevada, the Agency was requested by the DOE to conduct, in co-operation with the

OECD NEA, a peer review of the Yucca Mountain Total System Performance Assessment supporting the site recommendation process (TSPA-SR). The primary objective was to review and critically analyse the performance assessment methodology and rationale used by the DOE in order to: identify consistencies and inconsistencies with international recommendations, standards and practices; provide a statement regarding the adequacy of the overall performance assessment approach for supporting the site recommendation decision; and provide recommendations for technical and other improvements. The international review team assembled by the Agency and the OECD NEA stated that "Overall ... the implemented performance assessment approach provides an adequate basis for supporting a statement on likely compliance within the regulatory period of 10 000 years and, accordingly, for the site recommendation decision". However, based on "a growing international consensus", the team also stressed that "understanding of the repository system and how it provides for safety should be emphasized more in future iterations, both during and beyond the regulatory period". In this regard, the team made recommendations on technical issues that the DOE should consider for future assessments.

An expert team visited Lithuania in May at the request of the local regulatory body to review safety analysis reports (SARs) relating to radioactive waste management facilities at the Ignalina nuclear power plant. The team reviewed the assumptions, analyses and conclusions underlying the safety case presented in the two SARs, concluding that the documents were excellent examples of a preliminary SAR. However, a number of improvements were felt to be necessary before they could be considered final SARs. The team also indicated the kinds of iterative discussions that would have to take place between the regulator and the operator to finalize the documents.

SAFETY OF RADIOACTIVE DISCHARGES

A new publication, *Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment* (Safety

Reports Series No. 19), describes an approach for assessing doses to members of the public as part of an environmental impact analysis of predictive radioactive discharges. This is achieved by using screening models that describe environmental processes in mathematical terms, producing a quantitative result. The report supports a Safety Guide on this subject and supersedes an earlier safety series publication.

In its role as the competent international organization on matters related to radioactive materials in the context of the London Convention 1972, the Agency published a report summarizing the accidents that have occurred at sea involving radioactive materials (IAEA-TECDOC-1242). The report was accepted at the 22nd Consultative Meeting of the Contracting Parties to the Convention. The Agency is also developing guidance for Contracting Parties on how to determine when materials being considered for disposal at sea are exempt from the Convention on radiological grounds.

Radiation protection has historically focused on the protection of people, but an increasing number of Member States have expressed interest in the protection of the environment as well. A meeting organized by the Agency in November provided an opportunity for both information exchange on appropriate regulatory and research developments, and also discussion of many of the issues being addressed as part of the development of guidance. The meeting concluded that a system for the protection of the environment (or biotic components of it) from the effects of ionizing radiation should take into account the current state of knowledge, but should not be restricted by it. Additional research priorities were identified, including development of a better understanding of the mechanisms by which radiation exposure relates to protection endpoints and relevant dose-response relationships, and an appropriate definition of quantities and units.

SAFETY OF RADIOACTIVE RESIDUES

In Resolution GC(44)/RES/15 in 2000, the Secretariat was requested "to develop ... during the

next two years ... radiological criteria for long-lived radionuclides in commodities, particularly foodstuffs and wood". Development of these criteria — intervention exemption levels — has, because of the complexity of the existing system of exemption, clearance and generic action levels, proved to be technically difficult and controversial. All of these levels can be regarded as defining the lower boundary of the scope of certain aspects of regulatory control. However, because of the differences between these aspects, and between different approaches to deriving the relevant levels, there are several sets of values. A Technical Committee meeting in July expressed concern that this could lead to confusion and contradiction in the implementation and enforcement of regulations. Work continued during the year, in consultation with the Radiation Safety Standards Committee and the Waste Safety Standards Committee, with the aim of developing a coherent system of radionuclide specific levels for defining the scope of regulatory standards which would, at the same time, respond to the resolution.

Under another technical co-operation project, a mission visited Gabon in June to evaluate the remediation programme for the closure of a uranium mining site. This was a follow-up to a preliminary radiological assessment of the environmental impact at the site in 1999 that highlighted some problems, in particular for the water downstream of the site. The mission team found that about 80% of the remediation work had been completed, with the remaining work to be finished by the end of 2002. The radiological condition of the air and of the water downstream of the site had improved considerably since 1999. The team concluded that the remediation programme was acceptable, but certain improvements were necessary to ensure the protection of the public and of the environment in the medium and long term.

A former uranium mining and milling facility in Tajikistan, where the majority of the tailings have not been stabilized or remediated and represent a potential source of radiation exposure for the local population and for neighbouring countries, was visited by a technical co-operation mission. In this case, the situation had not improved since a previous visit in 1999. The team provided field instruction on proper

monitoring techniques and procedures for identifying areas affected by tailings, and recommended the development of a remediation plan as a priority.

In September, at the request of the Kuwaiti Government and in co-operation with UNEP and WHO, the Agency organized a fact-finding mission to Kuwait. The team of experts visited most of the sites identified by the Kuwaiti authorities as having been affected or potentially affected by depleted uranium (DU) residues, agreed on the methodology for the assessment which will be part of the study, and formulated a plan for the sampling campaign scheduled for early 2002. The Agency also continued to co-operate with UNEP's investigations into the consequences of the use of DU in Kosovo.

A Safety Guide on the decommissioning of nuclear fuel cycle facilities was published. It applies to facilities such as: surface processing facilities for the mining and milling of uranium and thorium; uranium conversion and enrichment facilities; fuel fabrication facilities; spent fuel storage facilities away from the reactor; reprocessing facilities; and storage, treatment

and conditioning facilities for radioactive waste. This is the last in a set of three Safety Guides on decommissioning, supporting the Safety Requirements publication *Predisposal Management of Radioactive Waste, Including Decommissioning*, issued in 2000. (Safety Guides on the decommissioning of nuclear power plants and research reactors and of medical, industrial and research facilities were published in 1999.)

As part of a technical co-operation project to assist Kazakhstan in decommissioning the BN-350 fast reactor, the Agency organized a Technical Committee meeting at the Dounreay site of the United Kingdom Atomic Energy Authority (UKAEA) in June. An important objective of the meeting was to pass on the experience of UKAEA personnel in decommissioning the Dounreay Fast Reactor and Prototype Fast Reactor to the Kazakh participants. A major focus of the presentations made by the UKAEA was the handling and disposal of sodium and its residues, an issue of specific concern for the decommissioning of sodium cooled fast reactors. The Agency is also providing assistance to Lithuania in decommissioning Ignalina, and to Ukraine for Chernobyl units 1–3.