

Management of Radioactive Waste

Objective

To achieve global harmonization in policies, criteria and standards governing waste safety and public and environmental protection, together with provisions for their application, including state of the art technologies and methods for demonstrating their adequacy.

Radioactive Waste Management

In November, the Agency, in collaboration with the Swedish Radiation Safety Authority, organized an international workshop in Stockholm on 'High Level Radioactive Waste and Spent Fuel Management — Storage and Disposal'. The workshop emphasized that while storage was a management step, disposal was a management solution for radioactive waste. The workshop participants also recommended that comprehensive strategies for high level radioactive waste and spent fuel management be developed, with clearly defined end-points, including disposal.

The need continues to grow for increased storage capacity for the management of spent nuclear fuel after its removal from the reactor core. One option is to use dual purpose casks designed for both transport and storage. However, there are separate transport and storage regulations that need to be complied with, and the safety performance of these casks during both storage and transport has to be considered in a holistic manner. Following discussions at the international conference on 'Management of Spent Fuel from Nuclear Power Reactors', held in 2010, the Agency initiated a two year international working group to develop guidance on an integrated safety case for dual purpose casks for the transport and storage of spent fuel.

The International Project on Demonstrating the Safety of Geological Disposal (GEOSAF) was finalized at a meeting in May 2011. The project members shared experience on the demonstration of the safety of geological disposal. The project also focused on post-closure safety, and a pilot study on operational safety was initiated. The pilot study concluded that it is essential to develop an integrated safety case addressing both operational and post-closure safety. The participating Member States requested that this work be continued, and a follow-up project is to be launched in March 2012. GEOSAF also prepared a

questionnaire, based on the IAEA safety standards, to facilitate review of post-closure safety.

Decommissioning and Remediation

The International Project on Use of Safety Assessment in Planning and Implementation of Decommissioning of Facilities using Radioactive Material (FaSa), which began in 2008, was completed in 2011 (Fig. 1). All of the working groups completed

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their work on the development of recommendations for decommissioning safety assessments. The final meeting of the project, held in Vienna in November,



FIG. 1. Decommissioning of a glove box in a fuel fabrication facility.

reviewed the progress achieved in 2011. The main output of the project was recommendations on the use of decommissioning safety assessments in the planning and implementation of decommissioning, with an emphasis on a phased approach to the development of the safety assessment.

The Agency continued to assist Member States with the decommissioning of research reactors. In July, a workshop was held in Romania to demonstrate the review process for development of a decommissioning plan; a draft of the decommissioning plan for the Magurele research reactor was used as the test case. In 2011, the 'planning' phase of the Research Reactor Decommissioning Demonstration Project (R²D²P) was completed and preparations for the implementation phase began.

Significant progress was made in 2011 under the Iraq Decommissioning Project (IDP). Phase two of the

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IDP was initiated, with planning for decommissioning of five additional facilities and sites, including the IRT 5000 and Tammuz 2 research reactors. Experts reviewed a draft decommissioning plan that was subsequently submitted to the regulatory body for review. The Agency continued to provide expert advice, building upon a national policy and strategy for radioactive waste management that was drafted in November 2009.

The International Working Forum on Regulatory Supervision of Legacy Sites (RSLs) is aimed at strengthening regulatory supervision and remediation of legacy sites. RSLs covers activities such as facility decommissioning, remediation of contaminated lands and development of waste management related facilities. In 2011, a three year work plan for RSLs was finalized that focuses on: enhancing the regulatory regime, professional development of regulators, and applications of methods for safety and environmental assessments.

Three new technical reports on detailed aspects of decommissioning were published as part of the IAEA Nuclear Energy Series: *Selection and Use of Performance Indicators in Decommissioning* (NW-T-

2.1), *Redevelopment and Reuse of Nuclear Facilities and Sites: Case Histories and Lessons Learned* (NW-T-2.2) and *Decommissioning of Small Medical, Industrial and Research Facilities: A Simplified Stepwise Approach* (NW-T-2.3). A guide on decommissioning policies and strategies, to be published in the IAEA Nuclear Energy Series, was also completed. Work began on reviewing and updating the Agency’s technical reports dealing with decommissioning and remediation following a nuclear accident in the light of lessons learned from the accident at TEPCO’s Fukushima Daiichi nuclear power plant.

The International Decommissioning Network (IDN) is an important mechanism for the exchange of information on good international practice in decommissioning and in organizing training activities to aid the development of expertise, especially among young professionals. Several courses, workshops and group scientific visits, involving more than 80 participants from more than 28 Member States, were conducted in conjunction with the technical cooperation programme. In the future, the scope of the IDN will be increased to include collaborative projects in which participants will work together more intensively to share information on good practices in specific areas of decommissioning.

The Network of Environmental Management and Remediation (ENVIRONET) supports Member States in dealing with environmental remediation issues. In 2011, the network created a group in LinkedIn called ENVIRONET. Activities organized within ENVIRONET included mainly training events, panel sessions at international conferences and the annual meeting in Vienna.

Connecting the Network of Networks for Enhanced Communication and Training (CONNECT)

CONNECT is an Internet based platform for interconnecting Agency networks in the area of radioactive waste management, with the aim of increasing the participation of individuals and organizations and making available additional sources of information that complement existing training events (e.g. technical workshops, training courses, scientific visits). CONNECT also provides a mechanism for the continuous sharing of international best practices and lessons learned, and for professionals in the networks to receive timely and direct advice about possible solutions based on the collective experience of network participants. It

was initiated in 2011 with assistance from Sandia National Laboratories in the USA.

Contact Expert Group for International Radioactive Waste Projects in the Russian Federation (CEG)

The CEG was established in 1996 under the auspices of the Agency to promote international cooperation and assistance in addressing legacy spent nuclear fuel and radioactive waste management challenges. It comprises 13 Member States. By the end of 2011, the Russian Federation and international partners had defuelled and dismantled 196 decommissioned nuclear submarines (out of 200). One third of this work was funded by international partners, who also funded many key facilities for defuelling and for radioactive waste management at Russian shipyards. The defuelled reactor units are currently being placed in a storage facility. The transfer of spent fuel from submarines currently in storage facilities at former navy bases to reprocessing plants is now the priority of CEG members, and initial shipments of spent fuel from these bases were made in 2011. Another priority is management of legacy radioactive waste at former navy bases and the construction of a regional centre for conditioning and storage of radioactive waste. International programmes for recovering radioisotope thermoelectric generators (RTGs) that were used for navigation purposes along the coastline of the Russian Federation are being successfully implemented. Most of the 1007 RTGs have been recovered (with 119 remaining). In 2011, the Baltic Sea was completely cleared of RTGs.

Countries Embarking on Nuclear Power

Assistance to countries considering embarking upon nuclear power is organized through the Agency's Integrated Nuclear Infrastructure Group (INIG). The assistance is delivered through technical cooperation projects, Integrated Nuclear Infrastructure Review (INIR) missions, workshops and publications. In 2011, INIR missions were undertaken in Bangladesh and the United Arab Emirates. The missions' recommendations to both Governments focused on establishing a suitable radioactive waste management infrastructure and on

incorporating all nuclear fuel cycle issues into plans for the introduction of nuclear power.

An ASEAN regional workshop provided instructions to newcomer countries on the development of a policy and strategy for radioactive waste and spent fuel management. And a national

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workshop on planning for radioactive waste and spent fuel management was held in Vietnam. Workshop participants indicated that major challenges faced by embarking countries included obtaining practical guidance on establishing national radioactive waste management infrastructure, selecting optimal waste processing and disposal technologies, and developing the required facilities. Capacity building, including the training of local staff to run waste management programmes, was also seen as a challenge.

Expert Review Activities

The Agency organized several expert review missions related to waste management, decommissioning and environmental remediation. For example, proposed design options for a near surface repository for short lived radioactive waste, to be located in the vicinity of the former Ignalina nuclear power plant in Lithuania, were reviewed. In Malaysia, a review was undertaken of the ongoing site selection programme for a near surface repository for short lived radioactive waste. A separate mission to Malaysia reviewed a project concerned with the construction of a rare earths processing facility. The safety case for a planned near surface repository near the Cernavoda nuclear power plant in Romania was also reviewed. A review of the decommissioning programme being implemented for the United Kingdom's fleet of first generation gas cooled reactors was completed, in which the review team noted significant advances in the decommissioning programme since an initial review mission in 2008.