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.

Waste and Environmental Safety

Radioactive waste and spent fuel management

The 4th Review Meeting of the Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management took place in May, with the participation of 600 delegates from 54 Contracting Parties. The Review Meeting noted that, although significant progress had been made since the last Review Meeting, challenges remained, including ensuring the robustness of the review process itself, the availability of spent fuel storage capacity and the delivery of disposal solutions.

In September, the Agency launched an international project on 'Human Intrusion in the Context of Disposal of Radioactive Waste' (HIDRA). This two year project seeks to provide guidance on how to address the aspects of potential human intrusion and human actions in the demonstration of safety of radioactive waste disposal facilities.

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Assessment and management of environmental releases

In November, the Agency launched a four year project entitled 'Modelling and Data for Radiological Impact Assessments' (MODARIA) to strengthen the capabilities of Member States in assessing radiological impacts on people and the environment. The initial meeting was attended by 140 participants from more than 40 Member States, during which ten working groups were set up addressing such areas as remediation of contaminated areas, uncertainties and variability associated with model predictions, radiation exposures and effects on biota, and marine modelling.

The Agency, in its role as the competent international authority on technical matters related to radioactive waste, continued to advise the Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (including radioactive waste) (the London Convention) and the Radioactive Substances Committee of the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention) on the assessment and evaluation of radiological impacts to people and the environment. At the request of the Contracting Parties to the London Convention, the Agency provided a method to derive levels of activity concentrations for material that might be disposed of at sea providing a de minimis radiological impact. For the purpose of the OSPAR Convention, and as requested by its Radioactive Substances Committee, a methodology was developed to define radiological environmental assessment criteria for marine waters.

Decommissioning and remediation safety

The Agency's Safety Requirements for decommissioning, published in 2006, incorporate three strategies for decommissioning. One of these is 'entombment', which is a strategy by which radioactive contaminants are encased in a structurally long lived material until radioactivity decays to a level permitting the unrestricted release of the facility, or release with restrictions imposed by the regulatory body. In a revised Safety Requirements document sent to Member States for comment in 2012, entombment was proposed as an option for decommissioning, to be used under exceptional circumstances. Work is under way to better define when it might be appropriate to apply the entombment option for decommissioning.

In June, the Agency established the Coordination Group for Uranium Legacy Sites. The aim of the group is to optimize resources for the remediation

of former uranium production sites, primarily in Central Asia but in other regions as well.

In August, the Agency and the United States Department of Energy jointly hosted scientific visits to former uranium processing facilities in Utah and Colorado, as well as an international workshop on 'Management and Regulatory Oversight of Uranium Legacy Sites: Perspectives from Regulators and Operators'. The workshop was organized under the International Working Forum on Regulatory Supervision of Legacy Sites (Fig. 1).

FIG. 1. Remediation of a former uranium mill facility in Utah, USA.

Good Practices and Technologies for Radioactive Waste Management, Decommissioning and Environmental Monitoring

Management (predisposal and disposal) of radioactive waste and spent fuel

The Agency continued to assist Member States in training and capacity building in radioactive waste management, including through URF (Underground Research Facilities Network), DISPONET (International Low-Level Waste Disposal Network) and LABONET (International Network of Laboratories for Nuclear Waste Characterization). Several workshops and technical meetings were organized on policies and strategies for waste management (Austria); advanced technologies for waste treatment and conditioning (Argentina); predisposal waste management (Russian Federation); waste characterization (Belgium); and waste acceptance procedures (France). In addition, training events were organized on stakeholder dialogue for radioactive waste disposal (Poland) and on the interaction of technical and social aspects in waste disposal programmes (Turkey).

A new CRP on 'Processing Technologies for High Level Waste, Formulation of Matrices and Characterization of Waste Forms' was launched with the participation of 18 research groups from around the world. The objectives are to encourage further research and development and exchange of information among Member States on improved processing techniques, formulation of vitreous and ceramic matrices for immobilization of high level waste and the characterization of waste.

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Decommissioning of nuclear facilities and environmental remediation of sites

Two projects were launched by the International Decommissioning Network (IDN): DRiMa (International Project on Decommissioning Risk Management) and DACCORD (International Project on Data Analysis and Collection for Costing of Research Reactors Decommissioning). The latter will utilize a software tool, CERREX (Cost Estimates for Research Reactor Decommissioning in Excel), that was recently developed by the Agency. A survey on the global Constraints to Implementing Decommissioning and Environmental Remediation was undertaken on the status of sites containing radioactive material and on factors that were constraining progress in the implementation of decommissioning and remediation programmes. An IAEA Nuclear Energy Series publication on *Policies and Strategies for the Decommissioning of Nuclear and Radiological Facilities* (NW-G-2.1) was issued.

Training events and scientific visits were organized by the Agency on a range of decommissioning issues. These included the basics of decommissioning and remediation (USA); remediation policies and strategies (Austria); management of decommissioning waste (Canada); development of training programmes for decommissioning (Russian Federation); a scientific visit to the José Cabrera nuclear power plant decommissioning project (Spain); development of remediation infrastructure (Germany);

decommissioning planning and licensing (Germany); and stakeholder involvement in remediation (Denmark).

Facilitating information exchange

Integrated Nuclear Infrastructure Review missions, which assist countries considering embarking on a nuclear power programme, were undertaken in Poland and Vietnam. These missions emphasized the importance of establishing a spent fuel and waste management policy and providing adequate infrastructure for radioactive waste management. In addition, regional workshops on possible cooperation between Middle Eastern and North African countries on the management of radioactive waste were held in Tunisia and the United Arab Emirates.

An international peer review was performed at the Korea Atomic Energy Research Institute (KAERI), Republic of Korea, to assess the feasibility of KAERI's approach to the development of a geological disposal system for high level waste and metallic waste from the pyro-processing of spent nuclear fuel. A final report was provided to KAERI containing the recommendations and good practices on the project.

Another peer review, in December, reviewed the integrated approach of the United Kingdom's Nuclear Decommissioning Authority (NDA) to the storage of higher activity waste packages. The mission focused on a technical review of the NDA document *Industry Guidance: Interim Storage of Higher Activity Waste Packages — Integrated Approach* in the context of the United Kingdom's waste management policy and long term waste management strategy. It also examined the consistency of the integrated approach in terms of waste packaging, storage and transportation as well as future disposal.