



Radioactive Waste Management

Almost all IAEA Member States use radioactive sources in medicine, industry, agriculture and scientific research, and countries remain responsible for the safe handling and storage of all radioactively contaminated waste that result from such activities. In some cases, waste must be specially treated or conditioned before storage and/or disposal. The Department of Technical Co-operation is sponsoring a programme with the support of the Nuclear Energy Department aimed at establishing appropriate technologies and procedures for managing radioactive wastes.

WAMAP - the first decade

Started in 1986, IAEA's Waste Management Programme has completed missions to over 40 developing countries. Strengths and weaknesses in waste management practices have been identified and improvements suggested to bring about significant improvements by countries' own initiatives or through Technical Co-operation (TC) projects. In 1996/97 new developments within the IAEA included:

- Passage of Resolution GC(40)/RES/12 by the 1996 General Conference in support of practical, hands-on training for operators in waste management facilities.
- Conditioning of all Ra²²⁶ sources in Uruguay in the first demonstration of a new technique to assure that these sources, which are being retired from service worldwide, will be safely stored.
- Establishment of a Model Project for transfer and implementation of appropriate technologies for managing waste in developing Member States.



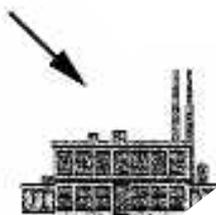
Radioactive waste



Storage

Classification of Member States based on types of waste generated

The IAEA has a responsibility to ensure that, when it supports Member States with TC projects, each country's waste management capability meets the minimum requirements to ensure that waste can be managed without undue risk.



Processing

Minimum requirements will differ but it is practical to group countries into different classes:

A- countries with limited use of radionuclides which require only a few simple waste management measures.

B- countries with multiple applications of radionuclides which require a national infrastructure for waste management.

C- countries with nuclear research reactors which require a national centre for waste treatment, conditioning and storage.

D&E- countries with nuclear power plants or other nuclear fuel cycle operations which require advanced technologies for managing wastes.

The Model Project

The IAEA recognizes that:

- the Model Project will provide a means to offer the Agency's initiatives in waste management technology to all Member States and to implement these on request;
- coherent administration of national programmes will improve the Agency's efficiency and implementation in Member States.

Expected results are that:

- in countries with a small number of spent sources or contaminated facilities, transfer of technology may result in **solution of the problem**;
- in countries that continually produce small quantities of radioactive waste (most developing countries), transfer of technology will result in **sustainable capability** to handle, treat, condition and store the waste;
- in countries that produce appreciable quantities on a regular basis, transfer of technology will provide **data and detailed plans** for establishing waste processing and storage facilities, disposal and decommissioning of nuclear installations.

Determining liquid waste treatment parameters.



Waste containing naturally occurring radionuclides, generally from mining and milling, are in a separate class (MM) and require appropriate waste management infrastructure to manage the generated waste safely.

Training is most important for those who actually handle radiation waste. IAEA provides opportunities for hands on demonstrations.

John Wiley, IAEA

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Achieving "minimal acceptable level"

For more than 10 years, Member States have benefited from support to upgrade all or part of their waste management infrastructure through special projects. Most of these have been implemented within the IAEA Technical Co-operation programme. Four new waste management technology packages have been prepared by the Agency to provide a more efficient and consistent basis for providing this support. A country's capability to manage waste can be raised to a minimal acceptable level with the help of one or more of the four "packages" developed by IAEA.

SRS Registry. A computerized registry that can help Member States keep track of all their sealed radiation sources from the cradle to the grave. This package includes training in the use and management of the registry as well as the software.

Demonstration of predisposal methods and procedures. This package is a supplement to the normal training courses and provides practical hands on experience with real waste in an environment similar to that in trainees' home countries.

Spent Sealed Sources Facility (SSSF) and Waste Processing and Storage Facilities (WPSF). A WPSF design has been prepared for those countries with solid and liquid waste to be processed, and a SSSF for those which have mainly spent sealed sources as waste.

Conditioning of spent radium sources. This package addresses the problem that although radium is no longer in use in most countries, spent sources must still be disposed of. The package includes three levels of support, which can be selected dependent on the technical capability of Member States:

- Technical documents;
- Expert advice;
- On request, a visit by an expert team to condition the radiation sources.



Preparation of specimens for leach and compression tests.



Conditioning radium sources for safe storage.

The conditioning concept

The concept is based on enclosing and sealing waste in stainless steel capsules, which are placed in a shielded storage container. This ensures safety of the sources for a storage period of at least 40 years. If necessary, the capsules can be retrieved for further conditioning prior to disposal in deep geological repositories.

Show and tell

The Agency has begun a hands-on demonstration programme which is jointly implemented by the IAEA and a Member State that offers its national waste processing and storage centre as a host facility. Such a centre can provide demonstrations and training for operators from throughout the region who need more practical experience with technologies that are appropriate for the wastes arising in their home countries. It will have:

- simple but proven techniques and equipment;
- qualified staff to operate the facility and to instruct and guide during demonstrations;
- specially designed demonstration programme for predisposal management of spent sealed sources and low and intermediate level liquid and solid wastes.



Cementation of the sludge from chemical treatment.

Demonstration is a group activity. The trainees gather in the Regional Centre and actively participate in all operations and procedures with real radioactive waste under the guidance of Centre staff.

Hands-on demonstrations are planned at host centres in every region. The first such demonstrations were held at the Cekmece Nuclear Research and Training Centre, Istanbul, Turkey in May 1996 for four countries; and again in June 1997 for four more countries. The Chilean Nuclear Energy Commission hosted a demonstration for four Latin American countries in May 1997. Arrangements have been made at the RADON facility, Sergiev Posad and the Bochvar Institute, Moscow, to provide demonstrations for the NIS and Eastern European countries in 1998.

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