



## **REGIONAL CO-OPERATION IN RADIOACTIVE WASTE MANAGEMENT FROM AN IAEA PERSPECTIVE**

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This paper is intended to be a lead in to a Round Table discussion on Regional Co-operation in Radioactive Waste Management at the International Conference on “Nuclear Option in Countries with Small and Medium Electricity Grids”, which will be held from 19 to 22 June 2000 in Dubrovnik, Croatia. The Round Table discussion will focus on international co-operation in the Eastern European region.

### **1. International Co-operation in IAEA context**

In the spirit of the Statute of the International Atomic Energy Agency international co-operation in the area of nuclear power, the nuclear fuel cycle and radioactive waste management is self-evident. While less than half of the IAEA Member States are directly involved in nuclear power and associated nuclear fuel cycle activities, almost all have a direct interest in the radioactive waste management issues. Indeed almost all have some type of waste, even when they only have a few nuclear applications in the medical sector for instance.

### **2. Resolutions on Strengthening International Co-operation**

The Resolutions by the General Conference are the highest level authoritative recommendations for the IAEA and some of these resolutions pertain to international co-operation in the radioactive waste management area. Recent resolutions in this area deal with “Measures to Strengthen International Co-operation in Nuclear, Radiation and Waste Safety.”

Specific Resolutions of relevance are for instance on:

- The Convention on Nuclear Safety.
- The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.
- The Safety of Transport of Radioactive Materials.
- The Safety of Radiation Sources and the Security of Radioactive Materials.

### **3. The IAEA’s Technical Co-operation Programme**

#### **3.1. Regional Agreements**

The Technical Co-operation Programme, approved by the General Conference, supports and endorses regional co-operation (and inter-regional) activities. Examples of regional co-operation in the waste management area exist or are planned in the African region

(AFRA), Latin American region (ARCAL) and the Asian region (RCA). These regional co-operation activities under regional co-operative agreements and their programmes are endorsed by the IAEA.

### *3.1.1 AFRA - African Regional Co-operative Agreement for Research, Development and Training related to Nuclear Science and Technology.*

The objective is to promote co-operation among the African countries in areas of common interest, and to maximise the utilization of available resources. The function of the IAEA is to encourage and assist the African Member States in the utilization of nuclear techniques for development (the Agency is not a party). To date, 26 countries participate (Algeria, Burkina Faso, Cameroon, Ivory Coast, D.R. of Congo, Egypt, Ethiopia, Ghana, Kenya, Libyan Arab Jamahiriya, Madagascar, Mali, Mauritius, Morocco, Namibia, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe). In the field of waste management, the Agency gives support to AFRA through the project "Strengthening waste management infrastructure" (RAF/4/015). The objective is to improve the waste management infrastructure in participating countries and to help design practical solutions to waste management problems, as well as to assist in the harmonization of practices in the area, and to introduce safe technologies for the storage of radioactive sources through AFRA specialized teams.

### *3.1.2 ARCAL - Arreglos Regionales Cooperativos para la Promocion de la Ciencia y la Tecnologia Nucleares en America Latina*

ARCAL is a mechanism for the promotion of technical co-operation among the Latin America and Caribbean countries in the specific use of nuclear energy. To day 19 countries participate (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, Venezuela). At the present time, there is no specific project in waste management. However, projects on the management of spent fuel and associated waste management activities are under consideration.

### *3.1.3 RCA - Asian Regional Co-operative Agreement Project on "Preparation for the Disposal of Low and Intermediate Level Waste with Emphasis on Non-Power Sources" (RAS/4/016)*

This regional project, composed of 16 participating countries from the region - Australia, Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam, was first launched in 1995. The overall objective of the project is to develop a regional approach to address common technical issues dealing with low and intermediate level waste, specifically from nuclear applications, being generated in the various countries in the region. The Agency has recognised that this type of an approach is not only cost-effective and beneficial from a technical point of view, but also promotes and stimulates co-operation and communication among the regional Member States. The specific objective is to develop reference disposal concepts for low and intermediate level waste being generated in the respective countries. To date, three reference disposal concepts have been identified, covering the wide range of climatic conditions, site characteristics, waste inventories, etc., encountered in the various

participating Member States. At the upcoming meeting in Malaysia, this year, the results of the safety assessments carried out on the three concepts will be presented and discussed. Given the very positive results obtained to date, this model project has the potential to evolve into an inter-regional TC project to include the South American region.

### 3.2. IAEA Regional/Interregional Projects

The delivery mechanism used for international co-operation by the IAEA is mainly through TC projects (national and regional projects) but also Co-ordinated Research Projects. The TC projects include normally transfer of competence/knowledge through expert missions of external experts from Member States. They also include short, scientific visits of national experts and fellowships to upgrade skills by working for up to one year in organizations and facilities in countries which are more advanced in a specific area of interest. Since the purpose of the TC projects is to transfer competence and knowledge, the assistance by providing equipment is modest. A typical project has a budget of 100.000-200.000 USD per year and lasts over a period of 1 to 3 years.

#### *3.2.1 Model Project on "Upgrading Radiation and Waste Safety Infrastructure" (RAF/9/24, RAS/9/021, RAW/9/006, RER/9/056, RLA/9/030)*

The objective of the (regional) model project is to strengthen the radiation safety infrastructure of a number of selected Member States from all regions. The purpose is to develop a proper safety culture and infrastructure in these Member States in order for them to comply with the standards established by the Agency for protection against ionizing radiation and for the safety of radiation sources. The Infrastructure in Waste Management is one of the important components of the project. To date, 50 countries are participating in the project.

#### *3.2.2 Model Project on "Sustainable Technologies for Managing Radioactive Waste (INT/4/131)*

This model project is aimed at helping in the safe and appropriate management of radioactive materials and wastes through the transfer and establishment of sustainable technologies for the management of radioactive waste in selected Member States. The transfer of waste management technology is primarily intended to provide benefit to developing Member States that have waste from nuclear applications in medicine, research and industry.

One of the components of the project is the "Demonstration of predisposal radioactive waste management methods and procedures". The objective is to demonstrate to Member States specific predisposal practices, methods and procedures which are documented in IAEA Technical Reports or Technical Documents and are in agreement with internationally accepted standards and criteria. The hands-on waste technology demonstrations provide developing Member States with relevant technologies and practical experiences in all predisposal activities inherent in the management of waste from nuclear applications. To date, 10 'Predisposal demonstrations on low level waste and spent sealed source conditioning' have been held in countries in several regions (Chile, Turkey, Philippine, Russia) until now and two more are planned for 2000. By the end of 2000, participants from 50 countries numbering more than 100 persons will have attended the demonstrations.

The conditioning of spent  $^{226}\text{Ra}$  sources is also an important component of the project. Technical support is provided through direct assistance to the Member States (external qualified expert team or by qualifying a national team for the conditioning operation). To date, 19 countries have received assistance from the Agency and 4 national teams have been trained to carry out operations in their own country or are available for contracting by the Agency as and when required.

### *3.2.3 Low and Intermediate Level Radioactive Waste Disposal (RER/4/021) (regional project, cycle 97-98)*

The objective was to assist Member States primarily in Eastern Europe to ensure safe operation of existing pre-disposal and disposal facilities and to develop the capabilities of the local staff for evaluating long-term safety as well as the acceptability of past disposal practices. Fourteen countries participated in this project.

### *3.2.4 Upgrading Safety of Near Surface Waste Disposal Facilities (RER/9/057) (regional project, cycle 99-00)*

The objective is to improve safety of near surface disposal facilities with specific reference to operational safety, waste acceptance criteria, post-closure safety and upgrading or establishment of safety acceptance capability.

## **4. Considerations for Upgrading Waste Management Capacity in CEEC States and NIS of the former USSR**

The political and economic changes during the past decade in Central and Eastern Europe and the Newly Independent States (NIS) have brought to light a number of nuclear safety, radiation protection, and radioactive waste management problems. These problems are related to nuclear power reactors, research reactors and the institutional (industrial, medicine, agriculture and research) use of radionuclides and radiation sources. A first comprehensive review of those problems was made at a Forum in Vienna in 1993. As a result of this and many other meetings and fact finding missions, substantial international support has developed to address a wide range of problems. International organisations, like the IAEA, the CEC, EBRD, OECD/NEA, have given significant contributions to all areas and significant bilateral support has been addressing all or parts of the problems.

The highest priority has been given to the operational safety aspects of nuclear power plants where also the greatest progress has been made. This includes progress in the development of the national regulatory and legal infrastructure to manage nuclear safety issues where a number of positive examples can be given, such as in the Czech Republic and Lithuania.

The large number of organisations and countries contributing separately, or sometimes together in small groups, makes it difficult to get an overview of all the projects being implemented and all the problems being addressed. The co-ordination to avoid unnecessary duplication of work is recognised as an important issue which has yet to be solved in a systematic manner.

Although there are examples of very good progress in individual projects on upgrading waste management, including spent nuclear fuel, there has been less general progress in this area. One reason for that is that radioactive waste has not been recognised in the CEEC and NIS countries as a really urgent, and thus high-priority, area. With the improved situation related to operational safety of the NPPs, waste management problems are becoming more important for the overall safety situation in these countries. The increased awareness and concern of the general public about waste management issues in these countries has also been a contributing factor.

International support is provided through many different mechanisms and by many different organisations. The major funding organisations are: IAEA, EC through PHARE-programme, TACIS-programme and with support from DG-environment, OECD/NEA, EBRD (is in the process to establish decommissioning funds for Ignalina and Bohunice), and many individual countries through bilateral co-operation projects. All of those financiers have their preferred mechanisms and target areas which can be country-oriented or task-specific. Furthermore, some financiers have larger financial resources than others. The PHARE and TACIS projects have more financial resources available than most others, including those available from the IAEA. As well, IAEA has an active TC programme involving country-specific projects. These are designed to address the specific needs of a given Member State.

In 1998, a re-assessment of the waste management situation in the various Member States was launched by the IAEA. Specific areas that could be considered for potential international co-operation in some CEEC (Central and European Countries) and NIS include:

- Institutional aspects of radioactive waste management
- Managerial aspects of radioactive waste management
- Financial aspects of radioactive waste management
- Waste Management strategies and programmes
- Technical infrastructure
  - HLW/SF management
    - a) Storage of SF from NPP
    - b) Storage of SF from research reactors
    - c) Transport
    - d) Preparation for disposal
  - Low and Intermediate level waste management
    - a) Treatment and conditioning of NPP and research reactor waste
    - b) Treatment and conditioning of institutional waste
    - c) Interim storage
    - d) Waste characterization
    - e) Waste acceptance criteria
    - f) Repository development
    - g) Transport
    - h) Spent sealed sources
    - i) Planning to decommissioning
    - j) Unusual waste streams
- Uranium mining and milling operations
- Remediation