

## RADIOACTIVE WASTE MANAGEMENT - BUILDING INTERNATIONAL CONSENSUS

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### ABSTRACT

This paper provides an overview of international cooperation in the field of radioactive waste management. The need to build on existing international consensus in the field is discussed along with specific IAEA activities that have been formulated to foster international cooperation. The paper notes that opportunities exist for greater regional and international collaboration in the future and challenges the waste management community to accept and fully commit to these opportunities.

### INTRODUCTION

On behalf of the International Atomic Energy Agency (IAEA), I thank the organizers for inviting me to open this plenary session and for the opportunity to address this distinguished audience.

The theme of this year's symposium, "Working Towards a Cleaner Environment", has never been more appropriate and relevant than now. These days, it seems not a week passes by without a seminar or conference on the subject of our environment. Over the past several years, this awareness and interest have extended beyond local domains to a more regional and global level. Today, the subject of the environment, its maintenance, protection or restoration is receiving heightened attention at the international level as transboundary considerations become a major factor in the assessment of disposal methods and practices for hazardous effluents including radioactive wastes. For example, in a few months, much of the world will focus its attention upon an important conference, the United Nations' Conference on Environment and Development - the Earth Summit, in Rio de Janeiro. This conference has already drawn a great deal of interest and attention. It has generated some heated discussions and many new ideas on global environmental initiatives. At this summit, it is expected that the discussions will lead to the setting of agreed guidelines that can eventually shape future governmental and international actions - not an easy mission, I am sure. Notwithstanding the final results of this very large, politicized conference, the fact that governments and international organizations are coming together to realize a collective purpose will be in itself an achievement.

The increase in the numbers of specially convened inter-governmental and international working groups and ad-hoc committees not only demonstrate the new momentum in the international arena on working toward a cleaner environment, but also reflects an awareness by governments that the public no longer accepts a "laissez-faire" attitude on the issue.

#### Radioactive Waste Management and the Environment

There is no doubt that radioactive waste management, including disposal, is a component of the global environmental protection problem. In the environmental debate there is sometimes a tendency to "write off" nuclear power as a future source of energy due, in part, to a strong general perception that the resulting radioactive effluents can not be managed and disposed of properly. There are also concerns regarding the safety and potential future effects of waste disposal on human health and the environment, including the problem of

potential transboundary movements over the long period of time required for the isolation of some radioactive wastes. Ironically, however, unlike other energy production fields, radioactive waste management requirements and technologies have developed in parallel with nuclear power, and experts in the field agree that safe and environmentally sound management and disposal methods are available for all types of radioactive wastes. The issue then, that faces us, is how do we bridge the gap between the technical opinion of experts and the lack of confidence of the public on the scientific community's ability to safely manage and dispose of radioactive wastes.

#### The Need for International Consensus

There is no one single solution or direction that will remove all of the negative perceptions associated with radioactive waste and its disposal. However, by showing that international consensus for many aspects of waste management and disposal do exist, and by building consensus where it does not yet exist would certainly create a more favorable climate for building public confidence, which is a prerequisite for making real progress in the disposal of radioactive wastes.

A significant step in this direction was taken in March 1991, when the International Collective Opinion was formally presented by high level experts from the Commission of the European Communities (CEC), the IAEA, and the Nuclear Energy Agency of the Organization for Economic Co-operation and Development (NEA/OECD) in Paris. The Opinion is a landmark statement regarding the status of scientific evaluation of radioactive waste repositories. One important conclusion of the Opinion is that the appropriate use of safety assessment methods, coupled with sufficient information from the potential sites, can provide the technical basis to determine whether radioactive waste disposal systems would offer to society a satisfactory level of safety for both current and future generations. The Opinion was significant not only from a technical viewpoint but also from the fact that it showed a great degree of agreement and consensus on the subject among experts and scientists around the world.

Thus, I repeat, the task at hand is the transformation of international consensus of experts to the public, and also to work toward building consensus where it does not exist through enhanced international co-operation.

### INTERNATIONAL CO-OPERATION AND WASTE MANAGEMENT

I should mention that in the field of radioactive waste management, international co-operation and collaboration is

not a new concept. For many countries and international organizations, information and technology exchanges and joint R&D efforts have been an integral aspect of their program.

#### Contribution and Significance of Co-operation

There have been three main fora of international co-operation in radioactive waste management: 1) through bilateral arrangements between countries and/or organizations; 2) on a regional level; and, 3) on the international arena through international organizations. The co-operations have been very successful with emphases on information and technology exchange, including joint research and development and demonstration projects. This type of co-operation has many benefits and is extremely practical for several reasons, the first reason being economics. It makes good economic sense to share the cost of large scale and/or long term projects with other organizations. Second, joint activities or exchanges allow organizations to share and learn from each other's experiences, and compare future strategies. The resulting benefit is that it prevents some duplication of effort. International organizations like the CEC, the NEA of the OECD, and the IAEA play a major role in this area by facilitating the information and technology exchange and transfer. Third, joint projects create a support network and a system of formal and informal peer reviews. This external review process enhances and adds technical credibility and validity to national approaches and methodologies. And, finally, co-operation and exchange is required and used by countries as a mean of check and balance - a sort of calibration.

#### **THE IAEA'S ROLE IN INTERNATIONAL CO-OPERATION**

Being associated with the IAEA activities for 30 years now, I would like to use my background knowledge of this international organization to illustrate the role and contribution that such organizations can make international co-operation using the example of the safe management of radioactive wastes.

Article II of the IAEA Statute states that the "IAEA shall seek to accelerate and enlarge the contribution of atomic energy to peace, health, and prosperity throughout the world...". This mission has been the IAEA's "raison d'être" since its inception in 1957. Radioactive waste management has a prominent status as an Agency activity and has to be dynamic in nature to keep pace with the changing needs of Member States. Meeting these needs is a challenge in itself considering the diverse nature of waste management activities that are planned or underway in our Member States. The main objective of the waste management program is to ensure the safe management and disposal of radioactive waste in accordance with the IAEA's mandate to promote the safe and peaceful use of atomic energy.

From the early days of the IAEA's program, all aspects of the industrial use of nuclear power were addressed including radioactive waste handling and treatment technology, underground waste disposal, and environmental aspects of nuclear energy. The environment part of the program, similar to current emphases, focused on the assessment of radiological and non-radiological consequences of discharges from nuclear facilities, including *de minimis* concepts in waste

disposal and environmental models and data for radionuclide releases.

Though some emphases may have changed, the main objectives of the waste management program have not changed significantly over the past 20 years. The program's objectives are achieved by assisting its Member States in the safe and effective management of wastes by organizing the exchange and dissemination of information, providing guidance, technical assistance and advisory services, and supporting research.

#### **MAJOR DIRECTION OF PRESENT AND FUTURE IAEA ACTIVITIES IN WASTE MANAGEMENT**

In keeping pace with the ever changing global scenario and needs of its 113 Member States, the IAEA, like other organizations, must continually assess its programs on both a medium- and long-term bases. In doing so, the challenge often comes not only in determining the possible solutions to those needs but in determining the appropriate course of implementation.

The next ten years will be an interesting and demanding period for the IAEA's waste management program. During this time, more countries will begin disposal operations for low and intermediate level wastes, and, by the end of the first decade of the next century, some countries plan to implement the disposal of high level waste (HLW) and/or spent fuel in deep geologic repositories. As these national programs move toward actual implementation of disposal systems, three waste management trends become evident: 1) the need for more internationally accepted waste management standards and international protocols and conventions will increase, 2) international peer reviews will be useful in complementing national review programs, and 3) there is a potential for regional and international co-operation in the management and disposal radioactive waste.

#### Establishment of Internationally Accepted Standards and Criteria

The need and call for internationally accepted standards and criteria in radioactive waste management and disposal will become even greater in the years to come. At the IAEA, this trend is supported by a great number of Member States requesting efforts in providing evidence that radioactive wastes can be managed effectively and safely. More specifically, the IAEA should demonstrate harmonization of approach at the international level by promulgating standards that are developed, discussed and agreed upon internationally.

#### **RADWASS**

In response to this request, the IAEA in 1991 established the Radioactive Waste Safety Standards (RADWASS) program to develop a special series of safety documents specifically directed at radioactive waste management. The purpose of the RADWASS program is to (i) document existing international consensus in the approaches and methodologies for safe waste management and disposal, (ii) create a mechanism to establish consensus where it does not exist, and (iii) provide Member States with a comprehensive series of internationally agreed documents to complement national standards and criteria.

The program has been organized within the framework of a hierarchical structure of four levels of safety documents. The top level publication will be a Safety Fundamental document which will provide the basic safety objectives and fundamental principles or requirements that must be incorporated in a national waste management program. The next level includes Safety Standards, Safety Guides, and Safety Practices documents. The series has been structured in a logical and clear manner so as to reflect the systems approach to waste management. In addition, the series of documents will encompass all safety related documents in the waste management area including the decommissioning of nuclear facilities and will be consistent with the other IAEA safety related publications.

The success of the RADWASS program depends not only on the IAEA having sufficient resources to commit to this challenge but the full co-operation of the international waste management community.

If you are interested in more information on the RADWASS programs, or any of the other IAEA waste management programs, I invite you to visit the IAEA information booth in the Convention Hall where a number of booklets are available for your reference.

#### Technical Peer Reviews and Advisory Services

I would now like to turn my attention to the important subject of peer reviews. Technical peer reviews have been an essential component of national waste management programs from the very beginning. Peer reviews are important for interpreting and verifying or validating assumptions, R&D results or conclusions critical to the success of programs. The requirement for external review or oversight is sometimes mandated by law as, I believe, in the case of the Technical Review Board for the U.S. Civilian Radioactive Waste Management Program. While peer reviews may not be legally required in all countries, external reviews are and have been a formal aspect of many programs. As programs move toward common phases of development, there will be an inevitable increase in the use of independent peer reviews, both domestic and international, to bolster technical confidence, strengthen program credibility, and more importantly, foster public acceptance of national waste management programs.

At the IAEA, the need to offer direct type of advisory services and peer reviews to the Member States has become quite apparent. During the past 5 years, three main services have been implemented - the Waste Management Advisory Program (WAMAP), the Waste Management Assessment and Technical Review Program (WATRP), and the Spent Radiation Source Management Program (SRSP). I would like to discuss each of these important programs in some details as I believe they represent an area of particular importance in the arena of international co-operation.

#### WAMAP

WAMAP was developed to facilitate the IAEA's efforts to provide direct assistance to developing Member States for the management of radioactive wastes in a safe and environmentally acceptable manner. The program provides a technical assistance mechanism which offers international expertise on waste management problems and issues faced by developing countries. It is a means to develop and implement safe waste management solutions that consider the country's infra-

structure, human and monetary resources, and environment as well as other common problems faced in the region.

Since its inception in 1987, through December 1991, there have been 35 WAMAP missions to 34 countries. The results, so far, have been a strengthening of waste management infrastructures, enhanced safety practices, and a greater commitment of resources to the waste problems faced by countries visited.

#### WATRP

Similar to WAMAP, the Waste Management Assessment and Technical Review Program is a advisory service available to Member States upon request. However, while WAMAP focuses on waste management concerns in developing Member States, WATRP was established to provide a mechanism for technical assessment and independent international peer reviews of waste management strategies and activities in Member States with developed nuclear programs. The objective of WATRP is to assist Member States with nuclear power plants and fuel cycle activities in their evaluation of the technical, operational, safety, and performance features of waste management systems planned or in operation. WATRP can be regarded as a way of assisting Member States in establishing public confidence, as well as offering valuable international technical review on planned national programs.

#### SRSP

Another area of major concern faced by many of the IAEA's mostly developing Member States is the management and disposal of spent radiation sources. Recent estimates indicate that over 25,000 spent radiation sources are unaccounted for in developing countries. These unmanaged spent sources offer the potential of high radiological risk to the public. Recently, the IAEA initiated the Spent Radiation Source Program that provides, depending on the country's waste management infrastructure, direct training and/or practical demonstration and implementation of techniques for the treatment, conditioning and disposal of spent radiation sources. The program marks the beginning of a new "hands-on" approach in providing assistance to developing Member States.

### **THE POTENTIAL OF GLOBAL INTERNATIONAL CO-OPERATION**

I have been discussing past and current efforts in regional and international co-operation. The natural question, at this point, is: "what about the future?". In light of recent changes around the world, the potential for enhanced regional and international co-operation, in general, and in areas of waste management, in particular, is growing and its utilization presents a new challenge for the waste management community. There are both requirements and opportunities for harmonization of approaches through the establishment of international standards, protocols and conventions through collaboration in joint international R&D and demonstration projects, including regional, multinational, and international storage and disposal projects, and through the enhanced exchange of information.

#### International Protocols and Conventions

Conventions or protocols are common mechanisms for international agreements on important and jointly shared

principles and a means of their implementation in the modern age. As you may know, there are several important international conventions in existence today, such as, the Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, the International Convention for the Prevention of Pollution from Ships (the London Dumping Convention), or prepared in the framework of the IAEA Convention on Early Notification of a Nuclear Accident, and the Convention on the Physical Protection of Nuclear Materials.

The International Conference on Safety of Nuclear Power: Strategy for the Future, hosted by the IAEA in September 1991, recommended that a new international nuclear safety convention, which would also include provisions on radioactive waste management and disposal, be developed. The IAEA General Conference, in September 1991, endorsed the idea and the initial steps in defining the possible elements of such a convention. An expert group was established to prepare an outline of the possible elements of such a convention. The scope and content of the convention have not yet been determined. However, the group has proposed two possible structures; 1) a framework convention supported by annexes or protocols on technical subjects of which some could be adopted simultaneously with the convention and others could be added at a later date, and 2) a single convention with technical annexes or protocols adopted at the same time. Although it is premature to anticipate the final outcome of this proposal, it can be said that such a convention could have far reaching effects. One of the obvious benefits would be the recognition by the public that their national program are adhering to internationally accepted safety standards.

#### **Joint International R&D and Demonstration Projects**

As I had mentioned earlier, joint R&D and demonstration projects have been a part of international co-operation for quite some time. As national waste programs develop new technologies for waste management and actual implementation of waste disposal, the opportunities for collaboration in R&D will increase, many of which are already underway such as the natural analog projects, safety assessment and model validation programs, generic repository siting studies, and etc.

Also there are several waste management activities that appears to receiving heightened attention such as the partitioning and transmutation of actinides and fission products. This concept, which is in the early stages of exploration, may significantly reduce the time period required to isolate high level wastes from the biosphere - thus improving the viability of the nuclear option. International co-operation and joint R&D projects in this area would provide a broad technical base, better utilize economic resources and may shorten the period necessary for full scientific evaluation of this concept.

In the past, a number of countries and international organizations have considered the concept of regional and international disposal facilities. For various reasons, these ideas were not realized, but it seems appropriate that this idea should be revisited.

As early as the 1970's, there were international studies and proposals to evaluate the technical feasibility and practicality of regional, multinational or international plutonium storage facilities, as well as studies for spent fuel storage facilities under the same concept. Specifically, between 1978-1981, the IAEA was directed to co-ordinate two such studies.

These studies were completed, published and presented to the Member States. The results: neither proposal found strong support. Mostly not for technical reasons. In the interest of time, let me just say that the studies had many merits and positive rationales. Some of the rationales, such as the optimization of existing facilities into regional ones and the economy of scale of fewer facilities, are even more applicable today. In fact, one of the most important arguments in support of this regional concept, ten years ago, is even more important and relevant today: non-proliferation.

For waste disposal, in particular, there are clear economic, technical, and safety factors that strongly support the regional repository concept. From the economic standpoint, countries with very small nuclear programs may find cost advantages in using regional or international repositories rather than developing small national disposal facilities. As for safety, one could suggest that if the total number of disposal sites were kept to the very minimum, there would be more control and less safety related concerns. Also where spent fuel is the final waste form for disposal, safeguards activities would be much easier to implement and manage under this concept.

Allow me to use Eastern Europe as an example of where a regional concept may be feasible. The countries in Eastern Europe (Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia) have relatively small nuclear energy programs which will eventually require disposal of high level waste. For each of these countries to develop respective repositories would be costly and unrealistic. One cannot argue that half a dozen disposal repositories is more environmentally benign, technically sound, economically advantageous, or safer than one regional facility.

Another example of where regional disposal facilities for low level waste may be beneficial would be in Africa where many of the countries in this region have similar waste streams and common management and disposal concerns. In this area, most of the waste generated are from nuclear applications and research where the total volume of waste is relatively small. Of course, the waste transportation argument would also have to be considered.

A major obstacle to such regional or multinational facilities is public and political opinion which can likely prevent a country from hosting such a project. In fact, this opinion may prove to be the greatest barrier to the realization of such concepts, since many national programs already face strong domestic opposition to disposal of waste generated within their own borders. The IAEA is now in the early stages of developing a report that will outline the benefits of the regional repository concept. It is our intentions that the paper, when completed, will serve as a catalyst to encourage preliminary discussions on the subject among countries that could significantly benefit from the use of a regional repository.

#### **CONCLUSION**

The next twenty years will certainly be an interesting and exciting, but critical, time in the waste management field of radioactive waste management and disposal, when we must work toward building consensus in all those aspects where international consensus does not yet exist. International organizations such as the IAEA must continue to assist, facilitate and provide the fora to bridge national and international efforts. Though the opportunities for international co-operations

tion and collaboration should be utilized to their fullest potential, national programs must continue on a course directed at enhancement of technical excellence, safety, protection of human health and the environment, and continue to build public confidence.

This, I believe, is the real challenge that faces the waste management community in the coming years. This challenge must be accepted and fully committed to if significant progress in building international consensus on the management and disposal of radioactive waste is to be realized in this decade.

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