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BOARD OF GOVERNORS
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MEASURES TO STRENGTHEN INTERNATIONAL CO-OPERATION IN NUCLEAR, RADIATION, TRANSPORT AND WASTE SAFETY

WASTE SAFETY
(Secretariat responses to waste safety issues of Member States)

1. The purpose of this document is to report on actions taken by the Secretariat since the forty-fourth (2000) regular session of the General Conference in response to waste safety issues of Member States and to secure the concurrence of the Board and the General Conference in the envisaged follow-up actions. The issues covered in this document are:

i) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
ii) Report on the Safety of Radioactive Waste Management; and
iii) Report on International Activities concerning Radioactive Residues.

I. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Background information

2. In September 2000, the General Conference, in resolution GC(44)/RES/12, appealed to all Member States which had not yet done so to take the steps necessary for becoming party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention).

3. On 20 March 2001, when Ireland deposited its instrument of ratification of the Joint Convention, the conditions for the Joint Convention's entry into force were met. The Joint Convention, pursuant to its Article 40, entered into force 90 days later - on 18 June 2001.

4. As of 30 June 2001, a total of 26 States had adhered to the Joint Convention: Argentina, Austria, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Morocco, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and the United Kingdom.

Action by the Secretariat

5. On 16 May 2001, by means of circular letter N5.56.2 Circ., the Director General, acting in his capacity as Depositary of the Joint Convention, informed all States that the Joint Convention would be entering into force on 18 June 2001.

6. On 12 July 2001, by means of Note Verbale J9-CN-83, the Secretariat informed all States that a preparatory meeting would be held from 10 to 14 December 2001 at the IAEA's Headquarters for the purpose of, inter alia, determining the date for the first review meeting of the Contracting Parties to the Joint Convention as referred to in Article 30 of the Joint Convention, preparing and adopting by consensus Rules of Procedure and Financial Rules, and establishing guidelines regarding the form and structure of the national reports to be submitted pursuant to Article 32, a date for the submission of such reports and the process for reviewing them. It is envisaged that the first review meeting of the Contracting Parties will take place in 2003.

II. Report on the Safety of Radioactive Waste Management

Background information

7. In September 2000, the General Conference, in resolution GC(44)/RES/12, invited all Member States to take the decisions necessary for the implementation of a national radioactive waste management policy, bearing in mind, inter alia, the Summary Observations, Conclusions and Recommendations of the International Conference on the Safety of Radioactive Waste Management held in Córdoba, Spain, from 13 to 17 March 2000 (the Córdoba Conference)[1] and requested the Secretariat to prepare a report on the safety of radioactive waste management and to submit it to the Board of Governors for its consideration, with the objective of assessing the implications for the Agency's programme of work of the Summary Observations, Conclusions and Recommendations of the Córdoba Conference and of assisting Member States, and, if appropriate, to propose actions, within existing resources.

Action by the Secretariat

8. In response to the request made of it in resolution GC(44)/RES/12, the Secretariat convened a small group of senior consultants which met from 15 to 17 November 2000 and prepared a draft report on the safety of radioactive waste management.

9. From 5 to 9 February 2001, a Technical Committee chaired by Mr. A. Baer (Switzerland) and consisting of participants from 13 Member States (Argentina, Australia, Belgium, Finland, France, Germany, Hungary, Indonesia, Slovakia, Spain, Sweden, the United Kingdom and the United States of America) and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA) considered the draft report and arrived at findings which may be categorized as (i) findings relating to technical aspects of the subject and (ii) findings relating to societal aspects.

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[1] The proceedings of the Córdoba Conference have been issue by the IAEA as publication STI/PUB/1094.

10. In its report, which was sent to Member States for comment, the Technical Committee recommended that further consideration be given to the IAEA's role in relation to the societal aspects. Accordingly, the Secretariat convened a second group of senior consultants (from Japan, the Republic of Korea, Norway, South Africa, Switzerland, the United Kingdom, the United States of America and a non-governmental organization) with experience of and expertise in societal aspects of radioactive waste management which met from 28 to 30 May 2001 under the chairmanship of Mr. O. Söderberg (Sweden).

11. The results of the meetings of the Technical Committee and the second group of senior consultants and the comments received from Member States were used as the basis for a draft report on the safety of radioactive waste management. This draft report was revised by a second Technical Committee, which met from 2 to 6 July 2001 under the chairmanship of Mr. J. Reig (Spain) and consisted of senior experts from Argentina, Belarus, Belgium, China, Cuba, Finland, Germany, Hungary, India, Mexico, the Netherlands, the Russian Federation, Spain, Sweden and the United States of America, and an observer from OECD/NEA.

12. On the basis of the revised draft report, the Secretariat prepared the Report on the Safety of Radioactive Waste Management which is contained in Attachment 1 to this document.

III. Report on International Activities concerning Radioactive Residues

Background information

13. Following the *International Symposium on the Restoration of Environments with Radioactive Residues* held in Arlington, United States of America, from 29 November to 3 December 1999 (the conclusions and recommendations of the Arlington Symposium were made available in the Appendix to the Attachment to document GOV/INF/2000/8-GC(44)/INF/5), the Ministry for Atomic Energy and the Academy of Sciences of the Russian Federation organized, in co-operation with the IAEA and the European Commission, an *International Conference on the Radiation Legacy of the 20th Century: Environmental Restoration* which took place in Moscow from 30 October to 2 November 2000 (the Moscow Conference).

14. Strong emphasis was placed in the Arlington Symposium and in the Moscow Conference on the need to promote the international harmonization of policies for restoring environments with radioactive residues. The participants in the Moscow Conference requested that the conclusions of the Conference, which are contained in Attachment 2 to this document, be drawn to the attention of the Board of Governors and the General Conference. An important recommendation of the Moscow Conference was that *relevant international organizations should continue to address the issue of environmental restoration and, in particular, should continue to endeavour to resolve policy issues such as those relating to: criteria for the restoration of areas affected by residues; and the trade in commodities from areas affected by radioactive residues*.

Action by the Secretariat

15. The Secretariat, which provided technical and administrative support for the organization of the Moscow Conference and will be issuing the proceedings as a technical document (IAEA-TECDOC) in the near future, has been actively engaged in the resolution of important issues referred to in the Moscow Conference's conclusions, such as the development of internationally accepted criteria for the restoration of areas affected by residues and for commodities from areas affected by radioactive residues (see, in the latter connection, Section III of document GOV/2001/29-GC(45)/12).

SUGGESTED ACTION BY THE BOARD

I. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

16. It is suggested that the Board:

(a) take note of the entry into force of the Joint Convention on 18 June 2001 and of the fact that the Secretariat has convened a preparatory meeting for the first (2003) Review Meeting of the Contracting Parties to the Joint Convention for 10-14 December 2001 at the IAEA's Headquarters; and

(b) encourage all States that are not Contracting Parties to the Joint Convention to take the steps necessary to become Contracting Parties in time to be able to attend the first Review Meeting of the Contracting Parties.

II. Report on the Safety of Radioactive Waste Management

17. It is suggested that the Board approve the *Report on the Safety of Radioactive Waste Management* contained in Attachment 1 and request the Secretariat to implement the actions proposed in it within existing resources and to inform the Board, as appropriate, of their implementation.

III. Report on International Activities concerning Radioactive Residues

18. It is suggested that the Board take note of the report on the conclusions of the *International Conference on the Radiation Legacy of the 20th Century: Environmental Restoration* contained in Attachment 2.

Report on the Safety of Radioactive Waste Management

Introduction

In response to the request made of it by the General Conference in resolution GC(44)/RES/12, the Secretariat has assessed the implications for the Agency's programme of work of the Summary Observations, Conclusions and Recommendations of the Córdoba Conference (GOV/INF/2000/8-GC(44)/INF/5).

This report contains the results of the assessment and, as requested in the General Conference resolution, a number of proposed actions. The Secretariat has been advised and assisted in the preparation of this report by two groups of consultants and two Technical Committees as detailed in the cover note to this document.

An important conclusion to be drawn from the assessment is that many of the safety issues raised at the Córdoba Conference are to some extent already covered in the Agency's existing and planned programmes of work. However, the discussions at the Córdoba Conference raised issues of a technical and of a societal nature and some issues which are a mixture of both. The Agency in its ongoing activities is addressing most of the technical issues, especially through its programme to develop safety standards in the radioactive waste area (the RADWASS programme). Societal aspects in the context of the safety of radioactive waste management have not been specifically addressed to date in the Agency's programmes.

The actions proposed in the following section are aimed at strengthening the work of the Agency in the most important areas for improving the safety of radioactive waste management, adjusting the emphasis of the existing programme in certain areas to reflect new priorities and introducing new items not at present included in the Agency's programmes.

Proposed actions

Action #1 - Develop a common framework for the disposal of different types of radioactive waste.

The IAEA has already published safety standards on near-surface disposal. However, the scope and some of the criteria underlying these standards are not applicable to waste containing long-lived radionuclides. This is particularly the case for waste from the mining and processing of radioactive ores and minerals and for waste from the remediation of areas contaminated with long-lived radionuclides. In other words, an appropriate disposal option for this type of waste consistent with waste safety principles is not currently presented within the Agency's standards. Another example concerns the disposal of spent radiation sources in boreholes, which does not fall clearly into the category of either near-surface or geological disposal. There is a need for a common framework of waste disposal principles which accounts for all the different types of radioactive waste.

Action #2 - Assess the safety implications of the extended storage of radioactive waste and of any future reconditioning which may be necessary.

One result of the deferral of plans to develop waste repositories is that waste is being stored at the surface for extended time periods. A conclusion from the Córdoba Conference was that the perpetual storage of radioactive waste is not a sustainable practice and offers no solution for the future. Significant safety issues are associated with such extended storage, including the possible degradation of the waste and its packaging and the need for extensive ongoing active institutional control and for the maintenance of knowledge and skills. The deferral of repository development may result in the need to recondition radioactive waste, possibly leading to additional safety problems. Thus, the Agency should investigate the role of extended storage in a sustainable programme of radioactive waste management, and especially the implications for safety.

Action #3 - Promptly develop safety standards for geological disposal addressing, inter alia, issues of human intrusion, institutional control, retrievability and the content of the safety case.

A number of Member States are actively pursuing programmes to site, characterize, qualify and construct geological disposal facilities. More national programmes of this type can be anticipated in the next decade. These programmes would benefit greatly from an international consensus on safety standards. Also of importance is the need to gain broader societal acceptance of these standards and of the disposal options they are intended to cover. The Córdoba Conference identified the need to actively pursue the development of international safety standards for such facilities. A number of issues were identified that require particular consideration - namely: establishing a means of showing that the repositories provide reasonable assurance of long-term safety, with emphasis on the role of natural analogues in this context; developing an internationally agreed approach to assessing the safety implications of potential intrusion by humans into the repository; reaching consensus on the role of institutional control as a long-term safety measure; determining the safety implications of making provision for the possible future retrieval of waste from repositories; and establishing generally the content of a safety case as a basis for the licensing of a waste repository.

Action #4 - Develop an internationally accepted and harmonized approach for controlling the removal of materials and sites from the regulatory system.

To date a considerable amount of work has been carried out in the Agency on approaches to applying the concepts of exclusion, exemption and clearance. This is particularly important in respect of decommissioning activities, rehabilitation and facilitating the unrestricted movement of commodities across borders. The Córdoba Conference highlighted the need for consistency in the treatment both of artificial radioactive materials and of naturally occurring radioactive materials (NORM). The Agency should facilitate the achievement of technical agreement in this area, thereby contributing to acceptance of the concepts by those in society likely to be affected by activities associated with them.

Action #5 - Develop a structured and systematic programme to ensure adequate application of the Agency's waste safety standards.

Ensuring the consistent application of the Agency's waste safety standards in Member States requires increased efforts from national regulators and their experts and from the Agency's Secretariat. The Agency should strengthen its mechanisms in the following areas:

- providing safety-related assistance;
- rendering peer review services; and
- promoting education and training.

Action #6 - Explore ways to ensure that information, knowledge and skills concerning radioactive waste management are made available to future generations.

This action arises from the need to ensure appropriate institutional control for all types of waste storage and disposal facilities (especially near-surface facilities containing intermediate and long-lived waste and facilities awaiting deferred decommissioning). One view on how such institutional controls might operate is that the present generation should pass on information, skills and knowledge to the next generation so that the latter can ensure the safety of the facility and decide on the need to continue with controls or take some other course of action. It is thus a process which emphasizes transfer between generations. The establishment of specific records is also a means of helping the process of long-term information transfer. The Agency should, through its mechanisms, promote discussion between Member States on these important safety issues.

Action #7 - Develop a step-by-step programme of work aimed at addressing the broader societal dimensions of radioactive waste management, including an appropriate mechanism to advise on such a programme and assess its suitability and progress.

There is an increasing recognition within Member States of the need to include the societal aspects in their national decision-making processes related to radioactive waste management. There is also a need to consider societal factors when making certain decisions - for example, on the acceptability of safety criteria and the standard of proof needed to comply with these criteria. This need has been recognized in the Agency's "Medium Term Strategy", in particular under goal D, aimed at achieving an effective interaction with non-traditional partners. The IAEA is also beginning to receive requests from Member States to review the societal as well as the technical aspects of their radioactive waste management programmes.

With this in mind, the Agency should develop a programme designed to foster international information exchange on the most effective ways of interacting with stakeholders as an essential part of the decision-making process in radioactive waste management.

The following specific steps are proposed:

1. identify case studies of projects, activities and procedures that have involved stakeholders and that have been carried out in different Member States covering such

areas as facility siting for both near-surface and deep geological facilities, standards development, as well as other cases from outside the radioactive waste management area, and make them available to Member States;

2. arrange and conduct meetings in which Member States with experience of broad dialogue with stakeholders make their experience available to other Member States, in particular those which do not have extensive stakeholder involvement experience; and

3. determine the lessons which can be learned from the above activities and present them in a generic manner to help inform and advise Member States on ways to improve their national programmes.

In relation to the above proposed programme, consideration should be given to inviting persons with expertise covering both technical and societal aspects of the subject to advise the Secretariat on the programme, on its content and on its effectiveness.

Conclusions of the *International Conference on the Radiation Legacy of the 20th Century: Environmental Restoration* held in Moscow, Russian Federation, from 30 October to 2 November 2000

Background

1. On all continents there are areas affected by radioactive residues due to past nuclear events and practices, such as nuclear explosions conducted for military and peaceful purposes, industrial activities, and nuclear and radiation accidents. The rehabilitation of such radioactively contaminated areas is a major problem for a number of countries, involving the expenditure of significant effort and resources.

2. In many countries, small-scale rehabilitation has been carried out in areas affected by residues from uranium mining and milling and from inadequately controlled industrial practices - for example, from the radium production and luminizing industries in their early days. Larger-scale rehabilitation has also been carried out in some parts of the world - for example, in the areas affected by the 1957 Kyshtym accident in the South Urals, Russia, by the 1986 Chernobyl accident in Belarus, Russia and Ukraine, and in areas affected by nuclear weapons testing such as the Pacific atolls Bikini, Mururoa and Fangataufa and Maralinga, Australia. In some countries such activities are only at the planning stage. However, on a world scale a considerable amount of experience has already been accumulated. That being so, the international harmonization of rehabilitation policies, approaches and methods is needed in order to guide national activities and to engender confidence among the people affected by clean-up operations in what is being proposed and planned.

3. These were the reasons for holding the *International Symposium on the Restoration of Environments with Radioactive Residues* in Arlington, United States of America, from 29 November to 3 December 1999, organized by the IAEA in co-operation with the US Department of Energy, the US Environmental Protection Agency and the US Nuclear Regulatory Commission, and the *International Conference on the Radiation Legacy of the 20th Century: Environmental Restoration* in Moscow from 30 October to 2 November 2000, organized by the Ministry for Atomic Energy and the Academy of Sciences of the Russian Federation in co-operation with the European Commission and the IAEA.

Scope of the Moscow Conference

4. The following issues were considered at the Moscow Conference:

- extent and nature of situations potentially requiring restoration in different countries;
- international and national criteria relating to the rehabilitation of areas affected by radioactive residues;
- monitoring and radiological assessment of affected areas;
- national experiences of the rehabilitation of areas affected by radioactive residues;
- decommissioning of nuclear facilities and remediation of waste storage facilities;
- application of information technologies in environmental restoration;

- economic, cultural and social aspects of decision making related to the remediation of contaminated lands.

Conclusions of the Moscow Conference

5. Having considered these issues, the Moscow Conference came to the following conclusions:

i) The Conference provided evidence of the wide variety of situations characterized by residual radioactive contamination in many countries. Examples were provided of contamination situations arising not only from the civilian nuclear industry - for example, from uranium mining and milling, nuclear fuel fabrication and processing and nuclear power plant decommissioning - but also from the military sector - for example, nuclear weapons production and testing and the operation of nuclear submarines - and as a result of nuclear and radiation accidents. Further scientific inquiry is needed in order to identify such situations and to objectively document the degree and geographic extent of the contamination and to assess its impact on humans and the environment.

ii) Radioactive contamination of the environment has caused the undesirable additional irradiation of populations and biota and has hindered regular economic activity. With the significant reduction in the production of nuclear materials, the discontinuation of nuclear weapons tests and the decommissioning of increasing numbers of nuclear reactors and other nuclear facilities, there is an opportunity to rehabilitate major areas and make them available for general use - a moral obligation of the present generation towards future generations.

iii) Studies of the characteristics of residual radioactive and chemical contamination must be carried out in advance of environmental restoration activities for the purpose of assessing the effectiveness of the various possible restoration strategies in reducing the associated risk to human health and to biota.

iv) The evidence presented at the Moscow Conference and at the Arlington Symposium indicates that for planned and controlled practices, such as the decommissioning of nuclear facilities, the radiological protection guidance provided internationally, in particular by the International Commission on Radiological Protection (ICRP), is generally acceptable as a basis for restoration actions. Essentially, this is that restoration actions should be guided by the well-established principle of optimization of radiological protection constrained by an appropriate fraction of the dose limit for the public.

v) In the case of the restoration of areas with residual contamination resulting from unplanned events such as nuclear and radiation accidents and from poorly controlled past practices, it is becoming evident that the international guidance on the subject provided by ICRP and IAEA is controversial. The controversy has arisen because of the difficulty, in some cases, of distinguishing between practice situations and intervention situations, but also because of the evidence that decisions on restoration actions are strongly influenced by local factors such as public opinion and legal and political constraints.

vi) It is thus necessary to distinguish between scientifically based environmental restoration decision-aiding by radiation protection experts and politically and socially influenced

decision-making by governmental and local authorities. Decision-making has to take account of the views of stakeholders and the general public.

vii) The aim of the rehabilitation of inhabited areas should be to make them suitable for normal economic and social life under safe conditions, with no commercial discrimination against local commodities (for example, foodstuffs and wood) due to long-lived radionuclides contained in them.

viii) The rehabilitation of agricultural land contaminated with radionuclides should include consideration of the following long-term countermeasures:

- agrotechnical measures (radical amelioration of pastures, soil liming, etc.);
- crop selection (selection of crops with low radionuclide accumulation characteristics, etc.);
- animal management (change from milk to meat production, etc.);
- product processing (production of cheese and butter from contaminated milk, etc.).

The experience of agricultural rehabilitation in areas affected by the Kyshtym and Chernobyl accidents and by nuclear weapons testing in the Marshall Islands has demonstrated the possibility of producing food which meets established radiological criteria.

ix) In planning the rehabilitation of contaminated areas, account should be taken of the potentially useful effects of natural processes such as radionuclide decay, migration and binding by ecosystem components, which can result in the reduction of potential external and internal population exposures.

x) Procedures intended to accelerate the process of the “self-cleanup” of forests contaminated with radionuclides have been shown not to be cost-effective from the radiological, ecological and economic points of view. Forests, classified according to radiation level, should be specially managed with a view to optimizing the control of radiological impact and gradually returned to economic use.

xi) In the decommissioning of potentially hazardous nuclear facilities and in the maintenance of radioactive waste storage facilities which were constructed at a time when safety requirements were less strict than today, special care may have to be taken to protect the public and the environment.

xii) When the resources available for the rehabilitation of contaminated areas are limited, the priorities for rehabilitation should be based on achieving the maximum reduction of risk to human health attainable with those resources.

xiii) With a view to promoting good practices in environmental restoration, there should be regular exchanges of information on the positive experiences being accumulated in the decommissioning of nuclear facilities, in the rehabilitation of radioactively contaminated areas and in the use of innovative technologies for those purposes.

xiv) Among the important issues not covered at the Moscow Conference or at the Arlington Symposium were the following:

- environmental restoration in the vicinity of sites where peaceful underground nuclear explosions took place;
- environmental implications of the utilization of weapons-grade uranium and plutonium for peaceful purposes;
- mechanisms for funding the environmental restoration of areas contaminated by radionuclides; and
- the impact of policies for protecting species other than humans on the criteria for restoration decision-aiding.

xv) The relevant international organizations should continue to address the issue of environmental restoration and, in particular, should continue to endeavour to resolve policy issues such as those relating to:

- criteria for the restoration of areas affected by radioactive residues, and
- the trade in commodities from areas affected by radioactive residues.

6. The Moscow Conference wishes these conclusions to be drawn to the attention of the IAEA’s Board of Governors and General Conference.