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Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management

Report by the Director General

Summary

Pursuant to resolutions GC(46)/RES/9.D and GC(47)/RES/7, reports on the following subjects are submitted to the Board of Governors and the General Conference for their information:

- development and application of IAEA safety standards (Annex 1);
- safety of research reactors (Annex 2);
- preparedness for and response to nuclear and radiological emergencies (Annex 3);
- transport safety (Annex 4);
- safety and security of radioactive sources (Annex 5);
- radiological protection of patients (Annex 6);
- occupational radiation protection (Annex 7);
- protection of the environment from the effects of ionizing radiation (Annex 8);
- safety of radioactive waste management (Annex 9);
- decommissioning of nuclear facilities (Annex 10);
- education and training in nuclear, radiation, transport and waste safety (Annex 11); and
- nuclear and radiation safety networks (Annex 12).

Development and Application of IAEA Safety Standards

A. International action plan for the development and application of IAEA Safety Standards

1. In March 2004, the Board of Governors approved the International Action Plan for the Development and Application of IAEA Safety Standards contained in document GOV/2004/6.¹ The implementation of the International Action Plan to date is described below.

A.1. Progress in implementing the International Action Plan

Action 1: *To complete the development of a corpus of thematic and facility specific safety standards. (Activity 1.1: To review the current corpus of safety standards to determine which additional Safety Requirements and Safety Guides are needed to complete the corpus, and to report to the June 2004 meeting of the Commission on Safety Standards. Activity 1.2: To consider the scope for new draft standards at the June 2004 meeting of the Commission. Activity 1.3: To prepare Document Preparation Profiles (DPPs) according to the agreed scope for new draft standards for submission to the November 2004 meeting of the Commission. Activity 1.4: To develop the agreed new standards according to the established procedures and within the defined time-scales.)*

2. The Commission on Safety Standards was informed in June 2004 of changes to the structure of the safety standards. It approved a revised structure which will be distributed as a brochure during the 2004 session of the General Conference. In connection with activities 1.3 and 1.4, a progress report is being prepared for submission to the Commission in November 2004.

Action 2: *To review and revise as necessary those safety standards that are under development so as to introduce the new structure efficiently. (Activity 2.1: To identify standards, current and under development, that need to be modified to be in accordance with the new structure, and to submit to the June 2004 meeting of the Commission a list of actions to be taken for each of these standards and draft standards and a timetable for these actions. Activity 2.2: To revise the document on the structure of the standards to reflect the decisions made by the Secretariat and the Commission, for presentation at the 2004 General Conference.)*

3. The Commission on Safety Standards was informed in June 2004 that the safety standards committees had not proposed any changes to the current draft safety standards and would like to complete the current drafts before embarking on the development of new standards.

Action 3: *To undertake the thorough review within the Secretariat of all draft standards and related publications for technical and terminological consistency with current standards and other safety related publications before they are submitted to the committees for review. (Activity 3.1: Progress to be reported to the June 2004 meeting of the Commission.)*

¹ See document GOV/OR.1089, paras 110-114.

4. The Commission on Safety Standards was informed in June 2004 that an internal Steering Committee on Safety and Security Publications had been established early in 2003. The Steering Committee's focus has been on safety standards, reviewing draft DPPs and standards prior to their submission to the safety standards committees and to the Commission.

Action 4: *To seek, as appropriate, the collaboration of other international organizations in developing the safety standards. (Activity 4.1: To develop a process together with relevant international organizations for facilitating the co-sponsorship of standards and to report to the November 2004 meeting of the Commission.)*

5. Work is under way on developing the process, and it will be reported on to the Commission on Safety Standards in November 2004.

Action 5: *To put in place a process for the rigorous internal review of Safety Reports and TECDOCs. (Activity 5.1: For Safety Reports and TECDOCs, to give priority to those that complement and are directly related to safety standards, and to seek guidance from the committees on their development.)*

6. The Commission on Safety Standards was informed in June 2004 that the focus of the internal Steering Committee on Safety and Security Publications now covers all safety and security related publications. The priority given to the safety standards and to safety related publications will be reflected in the programme and budget of the Department of Nuclear Safety and Security to be proposed for 2006–2007.

Action 6: *To put in place a process for the periodic review of safety standards. (Activity 6.1: To develop a process for the periodic review and revision (if necessary) of safety standards and to report to the November 2004 meeting of the Commission. Activity 6.2: To report on the status of implementation of the review and revision process to the June 2005 Commission meeting.)*

7. With regard to activity 6.1, work is under way on developing a periodic review and revision process, and it will be reported on to the Commission on Safety Standards in November 2004.

Action 7: *To promote the involvement of users of safety standards in their drafting; this should include users in industry, research and medicine, as appropriate, and also users in the relevant regulatory bodies. (Activity 7.1: To write to the appropriate national authorities requesting them to establish a process aimed at ensuring that relevant users of the safety standards are consulted on the drafting and revision of standards. To report on progress made at the November 2004 meeting of the Commission.)*

8. A report is being prepared for the Commission's meeting in November 2004.

Action 8: *To establish a process for obtaining information on the use of standards and feedback from the regulatory bodies and other users in Member States. (Activity 8.1: To produce a draft questionnaire for distribution to Member States to seek information on the application of the safety standards, for submission of a report to the November 2004 meeting of the Commission. Activity 8.2: To send a questionnaire to Member States and to assess the responses, for submission of a report to the November 2005 meeting of the Commission. Activity 8.3: To develop a mechanism for collecting feedback from the application of safety standards in the Agency's safety services and training courses and in other assistance provided to Member States, including activities for technical co-operation. Activity 8.4: To develop a mechanism for storing the information obtained from feedback on the application of standards in the Agency's safety services and from the use of standards in the Member States, for submission of a report to the November 2005 meeting of the Commission. Activity 8.5: To*

prepare a progress report on Activities 8.1 to 8.4 for consideration at the November 2005 meeting of the Commission and the March 2006 session of the Board of Governors.)

9. With regard to activity 8.1, work on the production of a draft questionnaire is under way and the results will be reported to the Commission in November 2004.

Action 9: *To develop a promotion and outreach strategy for communicating on all aspects of safety standards to potential users and others. (Activity 9.1: To put in place a process for providing Member States with the safety standards (and authoritative translations) in a timely manner and to submit a report to the June 2004 meeting of the Commission. Activity 9.2: To review the decision on the application of the copyright policy, which limits the free dissemination of safety standards, and to report to the November 2004 meeting of the Commission. Activity 9.3: To develop an outreach strategy for communicating on all aspects of safety standards with potential users and the public, and to submit a report to the November 2004 meeting of the Commission.)*

10. The Commission on Safety Standards was informed in June 2004 that the Agency's Publishing Section had recently published about 20 translated texts of safety standards. Arrangements are being put in place to expedite the translation process and the publication of translated texts. In connection with activities 9.2 and 9.3, progress reports are being prepared for the Commission's meeting in November 2004.

Action 10: *To request members of the Commission and the committees to play a more active part in communicating on and promoting the use of the IAEA safety standards and to share experience in the use they have made of the safety standards. (Activity 10.1: Members of the Commission and the committees to share their experience in the use of safety standards regularly at their meetings. Activity 10.2: To inform Member States of the strategy for safety standards and to invite them to participate actively in their national promotion and use. To provide explanations of and guidance on the aims of the safety standards programme, on the promotion and use of the standards, and on how best to participate in the safety standards programme. To report on progress made at the November 2004 meeting of the Commission.)*

11. The Commission on Safety Standards requested the Secretariat to prepare a proposal for the implementation of this action for consideration at its November meeting. In connection with activity 10.2, a report is being prepared for the Commission's meeting in November 2004.

Safety of Research Reactors

A. Background

1. In September 2001, in resolution GC(45)/RES/10.A, the General Conference endorsed a decision of the Board to request the Secretariat to develop and implement, in conjunction with Member States, an international research reactor safety enhancement plan that included the following elements:

- conduct of a survey of research reactor safety in Member States;
- preparation of a Code of Conduct on the safety of research reactors; and
- exploration of possible means to strengthen the system for monitoring the safety of research reactors.

2. In September 2003, in resolution GC(47)/RES/7.A, the General Conference noted that the final version of the draft Code of Conduct on the Safety of Research Reactors was expected to be resubmitted for consideration by the Board of Governors in March 2004. In the same resolution, the General Conference welcomed the continuing assistance provided by the Secretariat in monitoring and improving the safety of research reactors, particularly those subject to IAEA Project and Supply Agreements.

3. This report covers the work done with emphasis on developments since the 2003 session of the General Conference, on work planned for the balance of 2004 and for 2005, and on the vision regarding work to be done in 2006, 2007 and beyond.

B. Actions

Survey of Research Reactor Safety

4. By mid-July 2004, 60 of the 67 Member States that have or plan to construct research reactors had submitted responses for at least some of their reactors. The responses covered 251 reactors (including two planned and three under construction).

5. The responses received can be grouped as follows:

- responses for 149 of the 274 operational research reactors;
- responses for 50 of the 216 shut-down research reactors;
- responses for 47 of the 168 decommissioned research reactors; and
- responses for the two research reactors planned and the three under construction.

6. One of the main conclusions from the available data is that most of the reactors reported to be in extended shutdown are in Member States where the regulatory oversight programmes are considered to be good. Several cases were reported of reactors shut down for major modification or converted into another type of facility. Also, it was noted that research reactors are frequently characterized by their initial criticality date (and thus a calculable “age”) as a basis for objectively reflecting a level of safety.

While this may be appropriate for some structures, systems and components, it does not reflect any refurbishment that may have been carried out.

7. A final report of the survey results will be included in the draft Nuclear Safety Review for the Year 2004, which will be before the Board at its March 2005 meeting. Naturally, the Secretariat will continue to assist Member States in dealing with research reactor safety issues and ensuring the continuous improvement of research reactor safety.

The Code of Conduct on the Safety of Research Reactors

8. In March 2004, the Board of Governors adopted the Code of Conduct on the Safety of Research Reactors that is being submitted to the General Conference (in document GC(48)/7) with the recommendation that the General Conference endorse it and call for its wide application.¹

9. The Code of Conduct is a non-binding, stand-alone, international legal instrument. Its purpose is the achievement and maintenance of a high level of research reactor safety through the enhancement of national measures and international cooperation.

Monitoring of the safety of research reactors subject to IAEA Project and Supply Agreements

10. Agency technical cooperation programmes, the extrabudgetary programme on the safety of nuclear installations in South-East Asia, Pacific and Far East countries and the Regular Budget have provided support for the monitoring of research reactor safety, for which several mechanisms are available. The principal mechanism is the Integrated Safety Assessment of Research Reactors (INSARR) missions, which address, in an integrated manner, all aspects of safety, including maintenance and regulatory oversight, with follow-up missions carried out for the purpose of assessing progress in the implementation of INSARR team recommendations.

11. During the past four years, Agency missions have visited most of the 32 reactors subject to IAEA Project and Supply Agreements and, whenever necessary, have provided assistance in improving safety conditions. In general, the safety improvements were minor and not in response to significant concerns.

12. Four research reactors subject to IAEA Project and Supply Agreements have not been visited for several years. Three are low-power research reactors, while one is a 10 MW facility. For the 10 MW facility, a comprehensive report on its status was submitted to the Agency in 2002. Responses to the research reactor safety survey have been received in respect of all four of them.

13. Proper monitoring of the research reactors subject to IAEA Project and Supply Agreements cannot be accomplished just with Regular Budget resources if other core activities are not to suffer. Technical cooperation and extrabudgetary resources also have to be used. Even then, it is necessary to prioritize assistance visits and safety missions. Consequently:

- the safety of research reactors subject to IAEA Project and Supply Agreements that have been declared to be decommissioned is not being monitored; and,

¹ See document GOV/OR.1088, paras 191-195.

- priority has been given to monitoring the safety of research reactors in countries that do not have independent and well-established regulatory bodies.

14. The updated international plan for enhancing research reactor safety (see section C below) will include strategies for more effectively and efficiently fulfilling the Agency's responsibilities.

C. Continuing enhancement of research reactor safety

15. The Agency has established a number of safety standards that are fundamental to the enhancement of research reactor safety, and it is expected that a further standard — Safety Requirements for Research Reactors — will be published before the end of this year. New safety guides will be developed to support the Safety Requirements document.

16. In addition to organizing regular training courses and workshops, the Secretariat has been assisting Member States that have research reactors with the establishment of sustainable programmes of education and training in nuclear safety.

17. INSARR missions, supplemented by special-purpose missions, will remain the principal mechanism for monitoring and enhancing the safety of research reactors. The results of these missions will be fed into an integrated information system that will also receive inputs from the Agency's Incident Reporting System for Research Reactors (IRSRR) and the Agency's database relating to research reactors. Special efforts will be focused on the development of self-assessment capabilities in Member States, through information exchange and the participation of persons from those Member States as observers in INSARR missions.

18. The IRSRR, in which 42 Member States are now participating, has the potential to be a highly effective vehicle for information exchange. The Secretariat intends to expand the activities associated with the IRSRR — to include exercises with scenarios based on incidents in the IRSRR database, to conduct benchmark exercises for checking the adequacy of the events code list, to provide training in the investigation and root cause analysis of incidents and to continuously improve the Agency's research reactor web page.

19. To further strengthen its capabilities for monitoring the safety of research reactors subject to IAEA Project and Supply Agreements, the Secretariat plans to initiate a series of triennial meetings beginning in 2005. The purpose of the meetings will be:

- to make the authorities in Member States more aware of the importance of research reactor safety;
- to increase the Secretariat's knowledge of the safety status of research reactors; and
- to exchange information with a view to improving the safety of research reactors.

20. The Secretariat proposes to prepare an update of the International Plan for Enhancing Research Reactor Safety for the Board's consideration at its March 2005 meeting.

Preparedness for and Response to Nuclear and Radiological Emergencies

A. Background

1. Under the Convention on Early Notification of a Nuclear Accident (the Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (the Assistance Convention), the Agency performs a number of functions concerned with preparedness for and response to nuclear and radiological emergencies. Also, in fulfilling its statutory responsibilities it develops and provides for the application of safety standards relevant to emergency preparedness and response.
2. The Secretariat carries out the necessary activities primarily through its Emergency Preparedness and Response Section, which operates the Agency's Emergency Response System (ERS) and implements arrangements described in the Emergency Notification and Assistance Technical Operations Manual (ENATOM).
3. In September 2002, in resolution GC(46)/RES/9.D, the General Conference recognized "the need for enhanced efforts by the Secretariat in coordinating and facilitating international preparedness and response and thereby making it more consistent and coherent", requested the Secretariat "to seek ways of facilitating cooperation and coordination among Parties to the Early Notification Convention and the Assistance Convention to ensure adequate implementation and consider institutionalizing the Competent Authorities' Meeting"² and requested the Director General "to continue to evaluate and, if necessary, improve the capability of the IAEA Emergency Response System to fulfil its role as coordinator and facilitator of international emergency preparedness and response and to ensure sustainability of the System" and — in paragraph 6 — "to report, as appropriate, to it at its forty-eighth (2004) regular session on the implementation of this resolution."
4. In September 2003, the General Conference, in resolution GC(47)/RES/7.A, requested the Secretariat "to continue to seek ways of facilitating cooperation and coordination among Parties to the Early Notification Convention and the Assistance Convention to ensure adequate implementation, and to consider institutionalizing the Competent Authorities' Meeting", requested the Director General "to continue to evaluate and, if necessary, improve the capability of the IAEA Emergency Response System to fulfil its role as coordinator and facilitator of international emergency preparedness and response and to ensure sustainability of the System", supported the Secretariat's intention (expressed in Annex 4 to document GOV/INF/2003/15-GC(47)/INF/4) to develop a plan of action for enhancing the international emergency response system and — in paragraph 40 — requested the Director General "to report, as appropriate, to it at its forty-eighth (2004) regular session on developments relevant to this resolution in the intervening period."
5. This report has been prepared in response to the requests made in paragraph 6 of resolution GC(46)/RES/9.D and paragraph 40 of resolution GC(47)/RES/7.A, and it covers the period 1 July

² Competent Authorities' Meeting – Meeting of Representatives of National Competent Authorities identified under the Early Notification and Assistance Conventions, attended by representatives of national competent authorities both of States Parties to the Early Notification Convention and the Assistance Convention and of Agency Member States that are not Parties to the two conventions.

2002-30 June 2004. The activities described are all relevant to responding to emergency situations arising out of terrorist acts. Activities relating specifically to preparedness for such situations are described, under 'Activity Area VI', in document GOV/2004/50-GC(48)/6.

B. Response to emergencies

6. During the period 1 July 2002–30 June 2004, reports to the Agency of 53 events resulted in the ERS taking action to verify, provide information or advice and/or offer its good offices. In eight cases, which are summarized below, assistance was provided in response to requests made under the Assistance Convention:

- Bolivia, July 2002 - medical examinations of and dose assessments for a small group of members of the public who may have been seriously overexposed;
- Tanzania, November 2002 – analysis of confiscated nuclear material;
- Nigeria, February 2003 – technical advice following the theft of two americium-beryllium sources;
- Qatar, March 2003 – recovery of buried orphan sources;
- Ecuador, May 2003 – technical advice following the theft of five iridium-192 sources from a private company and the loss of a similar source;
- Georgia, July 2003 - long-term specialized medical treatment for two victims of the incident at Lilo, Georgia;
- Albania, December 2003 – securing of cobalt-60 source stuck in an oncology machine; and
- Russia, January 2004 - urgent provision of specialized medicine for the treatment of a victim of the incident at Lia, Georgia.

C. Making response capabilities more consistent and coherent

7. The Safety Requirements document “Preparedness and Response for a Nuclear or Radiological Emergency” (IAEA Safety Standards Series No. GS-R-2) was published in November 2002 in English and in March 2004 in French.³ Adoption of the Safety Requirements should result in greater consistency of the emergency response criteria and arrangements of different States, which would facilitate emergency response at the regional and the international level.

8. In December 2002, the Secretariat issued EPR-MEDICAL/T(2002), “Medical Preparedness and Response” — educational material for radiation emergency preparedness and response — on CD-ROM. This material is designed to help with the development of programmes for training medical personnel to recognize radiation overexposure and to manage the treatment of overexposed — and possibly contaminated — persons.

³ The Safety Requirements are co-sponsored by the Food and Agriculture Organization of the United Nations, the Agency, the International Labour Organization, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the Pan American Health Organization, the United Nations Office for the Coordination of Humanitarian Affairs and the World Health Organization.

9. In October 2003, the Secretariat issued EPR-METHOD(2003), “Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency”, the purpose of which is to help States achieve and maintain adequate preparedness for nuclear and radiological emergencies.

10. Currently, the Secretariat is developing a safety guide on preparedness for nuclear and radiological emergencies and a safety guide on technical criteria for responding to such emergencies.

11. Between 1 July 2002 and 30 June 2004, the Secretariat provided support for 17 regional and three sub-regional “train-the-trainers” courses on subjects related to preparedness for and response to nuclear and/or radiological emergencies. In total, 519 trainers received training through the courses. In addition support was provided for nine national courses at which 297 people were directly trained. Most of the activities in question were conducted within the framework of regional technical cooperation projects in Latin America and Europe.

12. The Secretariat has revised its Emergency Preparedness Review (EPREV) service for appraising the status of preparedness for nuclear and radiological emergencies in requesting countries, particularly in order to place greater emphasis on preparedness for malevolent acts involving radioactive material and for attacks on and the sabotage of nuclear facilities.

D. Facilitating international cooperation and coordination

13. The Secretariat, together with the Government of Romania and the Inter-Agency Committee on the Response to Nuclear Accidents (IACRNA)⁴, is planning a nuclear emergency response exercise — CONVEX-3 (2005) — which will take place in May 2005 in Romania and in which the mechanisms for emergency information exchange among contact points in Member States of the Agency and of the other participating international organizations will be tested over at least a 24-hour period.

14. In Annex 4 to document GOV/INF/2003/15-GC(47)/INF/4, the Secretariat reported last year on the Second Competent Authorities’ Meeting, which agreed on the establishment of a regionally balanced National Competent Authorities’ Coordinating Group (NCACG). The NCACG worked with the Secretariat on the preparation of the draft International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies that was before the Board of Governors for approval in June 2004 (see paragraph 21 below).

15. Pursuant to recommendations made by the Second Competent Authorities’ Meeting, the Secretariat: convened a technical committee that considered ways of facilitating the participation of States in the Emergency Response Network (ERNET) and revised the EPR-ERNET(2002) document so as to overcome difficulties in its application in some States (a new edition is expected to be issued late in 2004); increased the frequency of emergency drills for contact points and made the results available to all competent authorities; developed a simple mechanism for sharing lessons from events

⁴ The IACRNA, which is chaired by the Agency’s Secretariat, maintains the Joint Radiation Emergency Management Plan of the International Organizations (the Joint Plan). It is expected that the European Commission, the European Police Office, the Food and Agriculture Organization of the United Nations, the Agency, the International Civil Aviation Organization, the International Criminal Police Organization, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the Pan American Health Organization, the United Nations Office for the Coordination of Humanitarian Affairs, the United Nations Office for Outer Space Affairs, the World Health Organization and the World Meteorological Organization will participate in the implementation of the next edition of the Joint Plan, scheduled for publication before the end of 2004.

following which the Secretariat facilitated the provision of or itself provided emergency assistance; successfully encouraged the World Health Organization to establish a link with the European Bone Marrow Transplant Group's network of relevant medical resources; and initiated, with the World Meteorological Organization, the updating of the requirements for meteorological products.

16. As regards the General Conference's request that the Secretariat consider institutionalizing the Competent Authorities' Meeting, the Secretariat, which recognizes that competent authorities will have a major role to play in the implementation of the International Action Plan, is aiming to bring them together on a biennial basis. The Third Competent Authorities' Meeting is expected to take place, in Vienna, during the period 27 June–1 July 2005.

17. Principally through bulletins and during training courses, the Secretariat has been encouraging relevant officials in Member States to initiate actions leading to the accession of their countries to the Early Notification Convention and the Assistance Convention. Between 1 July 2002 and 30 June 2004, five Member States acceded to the Early Notification Convention and five to the Assistance Convention, taking the total numbers of Parties to 92 and 89 respectively.

E. Evaluating and enhancing the capabilities of the Agency's Emergency Response System (ERS)

18. A fundamental purpose of the Early Notification Convention and the Assistance Convention is the creation of an international network of authorized emergency contact points and competent authorities. The principal response functions assigned to the Agency under the two Conventions relate to: receiving and transmitting notifications, other information and assistance requests; liaising with other relevant international organizations; and providing/facilitating assistance. In addition, the Emergency Response Centre (ERC) authenticates and verifies unconfirmed reports of nuclear and radiological emergencies and endeavours to provide authoritative information without undue delay, and acts as the Secretariat's coordinating point for the provision of timely and accurate information for communication to State representatives and the news media.

19. The Secretariat has developed preparedness and response arrangements that include: the designation of staff members with relevant responsibilities and authority; maintenance of a Nuclear Accident/Radiological Emergency Assistance Plan (NAREAP); detailed procedures and checklists for use by response personnel; a training and exercise programme; maintenance of the ERC, with its communications and information handling technology and arrangements for the rapid deployment of appropriately equipped response teams and for the rapid procurement of equipment and supplies; maintenance of ENATOM; and liaison with other international organizations as described in the Joint Radiation Emergency Management Plan of the International Organizations.

20. In Attachment 8 to document GOV/2002/35-GC(46)/11, the Secretariat reported on an internal review of the ERS. Pursuant to the recommendations arising out of the review, the Secretariat has, using extrabudgetary and Regular Budget resources, enhanced the ERS's protected web site (ENAC), increased the ERS's field response capabilities and improved aspects of the ERS's communications and information management infrastructure. A follow-up review carried out in August 2003 showed that most of the recommendations had been either fully or partially implemented. However, it also showed —inter alia— that the ERS did not have enough regular human and financial resources and the required infrastructure to guarantee the fulfilment both of its response and of its preparedness

mandate. The Secretariat intends to address these issues as part of the implementation of Action C.2 of the International Action Plan.

F. The International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies

21. The Secretariat developed, with the NCACG, a plan of action for enhancing the international emergency response system. The International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies was approved by the Board in June 2004. It was before the Board in Annex 1 to document GOV/2004/40(Corrected) and is now available on the Agency website <http://nsweb-dev.iaea.org/tech-areas/emergency/>. The Secretariat and the NCACG are developing arrangements for its implementation (see paragraph 14 of the International Action Plan). A key success factor will be the assignment of a Secretariat staff member full-time to supporting its implementation. As stated in Annex 4 to document GOV/INF/2003/48-GC(47)/9, the Secretariat intends to identify the human and financial resources needed in order to support its implementation, to optimize the use of existing resources and, where necessary, to request additional extrabudgetary resources from Member States. Also, it intends to coordinate certain activities with those involved in implementing the Action Plan for the Safety of Transport of Radioactive Material (Actions xix and xx)⁵ and the Action Plan for the Safety and Security of Radioactive Sources.⁶

⁵ See Annex 4.

⁶ See Annex 5.

Transport Safety

A. Background

1. In September 2003, in resolution GC(47)/RES/7.C, the General Conference – inter alia – requested the Secretariat to develop, in consultation with Member States, an action plan based on the results of the International Conference on the Safety of Transport of Radioactive Material that had been held in Vienna in July 2003 and within the Agency's competence.

B. The International Action Plan for the Safety of Transport of Radioactive Material

2. In March 2004, the Board of Governors approved an international Action Plan for the Safety of Transport of Radioactive Material that was contained in the Annex 2 of document GOV/2004/2 and is now available on the Agency website <http://www-ns.iaea.org/downloads/rw/action-plans/transport-action-plan.pdf>. The Action Plan provides direction for the work to be done by the Secretariat in the field of radioactive material transport safety during the next five years.

C. Implementation of the Action Plan¹

C.1. The Agency's Transport Regulations

3. In June 2004, the Board of Governors approved the changes to be incorporated into the Regulations for the Safe Transport of Radioactive Material (the Agency's Transport Regulations – 1996 Edition (Revised)) that were presented in the Annex to document GOV/2004/41. The Secretariat is issuing the 1996 Edition (as amended 2003) of the Transport Regulations in the near future (see Action i).

4. In summing up the Board's discussion, the Chairman of the Board said that several speakers had felt that the process for reviewing the Transport Regulations involved excessive delays and should be reconsidered. The Secretariat is looking into this matter in the course of implementing Action iii.

¹ Only the principal steps already taken in implementing the Action Plan, which consists of 31 actions, are referred to in this report.

C.2. TranSAS missions

5. A TranSAS mission to France took place from 22 March to 2 April 2004. Reports on that mission and the TranSAS missions to Turkey in March 2003 and Panama in June 2003 will be issued in September 2004 (see Actions viii and x). Additionally, by letter dated 29 July 2004, the Secretary General of the Nuclear Safety Commission of Japan has requested the IAEA to organize a TranSaS mission to Japan. The Secretary General believes that such a mission would provide great opportunity to assure the appropriateness of Japan's transport safety regulatory practices as well as to promote a better understanding among the public concerning the safe transport of radioactive material in Japan. It is anticipated that this mission will be conducted in 2005 (see Actions viii and x).

C.3. Denials of shipments

6. The Secretariat has compiled information collected by Member States on numbers of and reasons for denials of shipments, and on 16 and 17 July 2004 it held — in London — a fact-finding and discussion forum on this issue attended by representatives of regulatory bodies, radiopharmaceutical producers, consigners and carriers. A consultants' meeting was convened during the period 26 to 30 July 2004 to analyse the information compiled by the Secretariat and the information from the forum and to make recommendations for dealing with this issue. The results of this analysis and the recommendations from the consultants' meeting can be found in a document on Status on Denial of Shipments of Radioactive Material and is now available on the Agency website <http://www-ns.iaea.org/downloads/rw/radiation-safety/gc-denial-of-shipments.pdf> (see Actions xi-xiii).

C.4. Education and training

7. The Secretariat held a training course in Singapore from 5 to 16 April 2004 for East Asia and the Pacific and one at Mol, Belgium, from 28 June to 9 July 2004 for West Asia. A training course in Lima, for Latin America, is being planned for late 2004, and the Secretariat plans to hold a training course for Europe in 2005. Thereafter, subject to the availability of financial resources, the Secretariat plans to hold a training course on transport safety in each of the five technical co-operation regions every two or three years (see Action xviii).

C.5. The EVTRAM database

8. In a circular letter dated 11 February 2004, the Secretariat reiterated its invitation to all Member States to provide the names and contact details of the persons who are authorized to submit, on behalf of their governments, information on transport events for inclusion in the EVTRAM (Events in the Transport of Radioactive Material) database. Only 38 Member States (27% of the Agency's 137 Member States) have thus far provided the requested information.

9. The Secretariat has started to work with Member States' contact points on ways of obtaining information for the EVTRAM database, encouraging them to use the data input programme developed with the assistance of the Swedish Government and available from the following website: www.amckonsult.se.

10. The data provided by Member States will be collated by the Secretariat; an evaluation of the responses will commence when a sufficient number has been received (see Actions xxv and xxvi).

C.6. Information on how Member States regulate transport

11. In a circular letter dated 16 December 2003, the Secretariat reiterated its invitation to all Member States to provide information on how they regulate the transport of radioactive material. To date, the transport safety web page shows inputs from 61 Member States (45% of the Agency's 137 Member States), representing an improvement over the 39% response rate achieved by the end of July 2003.

C.7. Liability

12. The International Expert Group on Nuclear Liability (INLEX), established by the Director General last year following the International Conference on the Safety of Transport of Radioactive Material, has held three meetings, in the course of which it finalized the discussion and review of explanatory texts (including an overview of the modernized IAEA nuclear liability regime) on the nuclear liability instruments adopted under Agency auspices. It recommended the circulation of the explanatory texts to Member States as constituting a comprehensive study of the Agency's nuclear liability regime in order to aid the understanding and authoritative interpretation of that regime. The overview is accordingly being submitted for information to the Board and the General Conference in the Annex to document GOV/INF/2004/9-GC(48)/INF/5 and the explanatory texts will be placed on the Agency website.

13. The explanatory texts will serve as a basis for the future work of INLEX, regarding in particular the further identification and exploration of issues pertaining to the application and scope of the nuclear liability instruments adopted under Agency auspices. In the context of recommending measures to be taken to enhance adherence to an effective nuclear liability regime, INLEX has, in cooperation with the Secretariat, developed, with a view to its being sent to Member States, a questionnaire on the status of adherence by Member States to nuclear liability instruments adopted under Agency auspices. The future workplan of INLEX will include the preparation of materials for regional and national workshops and for legislative assistance missions to target countries, organized with a view to strengthening Member States' legal frameworks related to nuclear liability.

14. INLEX will also consider the need to further develop the Agency's nuclear liability regime, taking into account concerns of countries both with and without nuclear power programmes. In this context, INLEX is working towards the identification of possible ambiguities and/or gaps in the existing international instruments. In addition, INLEX will undertake work relating to the identification of the advantages and/or disadvantages of adhering to a global nuclear liability regime.

C.8. Seminar on Communicating Complex Technical Issues

15. The Secretariat is planning a seminar, scheduled for October 2005, to consider the latest information on the complex technical issues involved in radioactive material transport safety (see Action xxix).

Safety and Security of Radioactive Sources

A. Background

1. Following the International Conference on the Safety of Radiation Sources and the Security of Radioactive Material held in Dijon, France, in September 1998 (the Dijon Conference), the Board approved an international Action Plan for the Safety of Radiation Sources and the Security of Radioactive Materials contained in Attachment 2 to document GOV/1999/46-GC(43)/10. Following the International Conference of National Regulatory Authorities with Competence in the Safety of Radiation Sources and the Security of Radioactive Materials held in Buenos Aires in December 2000 (the Buenos Aires Conference), it approved a revised international Action Plan for the Safety and Security of Radiation Sources contained in the Attachment to document GOV/2001/29-GC(45)/12. Subsequently, in March 2003, the International Conference on Security of Radioactive Sources was held at the Hofburg Palace, Vienna (the Hofburg Conference).

B. The International Action Plan for the Safety and Security of Radioactive Sources

2. On 8 September 2003, the Board of Governors approved an updating of the international Action Plan for the Safety and Security of Radioactive Sources as contained in Annex 1 to document GOV/2003/47-GC(47)/7, which had been formulated in the light of the findings of the President of the Hofburg Conference, and requested the Director General to implement it.¹

C. Implementation of the Action Plan

C.1. The Code of Conduct on the Safety and Security of Radioactive Sources

3. Also, on 8 September 2003, the Board of Governors approved the Code of Conduct on the Safety and Security of Radioactive Sources contained in Annex 1 to document GOV/2003/49-GC(47)/9.² Subsequently, on 19 September 2003, the General Conference, in resolution GC(47)/RES/7.B, welcomed the Board's approval of the Code of Conduct and the objectives and principles set out in the Code, while recognizing that the Code is not a legally binding instrument. Further, the General Conference urged each State "to write to the Director General that it fully supports and endorses the IAEA's efforts to enhance the safety and security of radioactive sources, is working toward following

¹ See document GOV/OR.1076, paras 55-60.

² See document GOV/OR.1076, paras 61-63.

the guidance contained in the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, and encourages other countries to do the same” and requested that “the Director General, subject to the availability of resources, compile, maintain and publish a list of States that have made a political commitment, as described... above”. Finally, the General Conference requested that: “the Director General to submit a report to the General Conference at its forty-eighth session on activities undertaken by the Agency... including actions undertaken under the Model Project to Upgrade National Radiation Protection Infrastructures”.

C.1.1. The political commitment: support for the Code of Conduct

4. Support for the Code of Conduct has been remarkable. As of 13 August 2004, 61 States (including two that are not Agency Member States) had made a political commitment to supporting the Code. Some States, and the European Union, have taken steps to promote the Code.³

5. The current list of countries that have made a political commitment is available on the Agency website: <http://www-ns.iaea.org/downloads/rw/meetings/code-conduct-signatories.pdf>.

C.1.2. Outreach programme

6. The Secretariat is organizing regional workshops in order to raise political awareness of the Code and to gain further support for it. The workshops will be financed from extrabudgetary funds. The target audiences will be governmental decision-makers with responsibilities relating to the safety and security of radioactive sources.

C.1.3. Guidance in support of the Code

7. Draft guidance relating to the import and export of radioactive sources in accordance with the Code was developed at a meeting of technical and legal experts held in February 2004. Consensus was reached on the text at a follow-up meeting held from 19 to 22 July 2004. The draft guidance will be submitted to the Board for approval at its September 2004 session. (See document GOV/2004/62-GC(48)/13).

8. The Secretariat is compiling a list of contact points with which it can liaise on matters relating to the import/export of radioactive sources. In January 2004, in a Note Verbale, it requested States to provide it with details of such contact points. It will publish the first version of the list later this year.

9. The Secretariat is updating the Regulatory Authority Information System (RAIS) to assist, inter alia, States implementing the Code of Conduct.

10. Following a Secretariat-organized meeting of source manufacturers/suppliers and regulators held in February 2004, the manufactures/suppliers have developed a first draft of their own Code of Good Practice and a proposal for the formation of a professional association focusing on the safety and security of radioactive sources.

³ The 61 countries that had written to the Director General as of 13 August 2004 are: Albania, Argentina, Australia, Austria, Belarus, Belgium, Bolivia, Bulgaria, Burkina Faso, Canada, Chad, Chile, China, Croatia, Cuba, Czech Republic, Denmark, Estonia, Ethiopia, Finland, France, Ghana, Germany, Greece, Hungary, Israel, India, Ireland, Italy, Japan, Korea (Republic of), Lithuania, Luxembourg, Malta, Mexico, Morocco, Namibia, Netherlands, Norway, Pakistan, Paraguay, Philippines, Portugal, Romania, Russian Federation, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Syrian Arab Republic, The Former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, United States of America, Uruguay, Uzbekistan, Venezuela, Yemen.

C.1.4. Model Project to Upgrade National Radiation Protection Infrastructures

11. In resolution GC(47)/RES/7.B, the General Conference also urged the Secretariat to “continue to use the Technical Cooperation programme, particularly the Model Project to Upgrade National Radiation Protection Infrastructures... to help Member States in implementing the Code”. At the November 2003 Technical Assistance and Cooperation Committee (TACC) session and the subsequent session of the Board, the Secretariat presented, in GOV/INF/2003/19, the third interim report on the implementation of the Model Projects, summarizing the progress made by nearly 90 participating countries between October 2001 and September 2003.

12. As recommended by TACC, the Board, in its Report of the TACC meeting (GOV/2003/74 Annex 1, para. 7) stated “many members took note of GOV/INF/2003/19... and placed importance on these TC projects”. It was also noted that “the Secretariat intends to report on the implementation of the Model Projects to the Board in November 2004”.

C.2. Establishing recommendations, guidance, norms and standards

13. In February 2004, the Secretariat issued IAEA-TECDOC-1388, entitled “Strengthening control over radioactive sources in authorized use and regaining control over orphan sources, National strategies”.

C.3. Promoting research and development

14. The Secretariat has continued to work with source manufacturers on strengthening the safety and security of radioactive sources through design and manufacturing improvements. A technical meeting on this subject will be held at the end of August 2004.

15. The Secretariat has continued supporting R&D work on disposal options for spent radioactive sources, including the development of standards and safety assessment methods and the demonstration of the feasibility of the borehole disposal concept (see Annex 9).

C.4. Providing direct technical services and advice to Member States with regard to high-activity disused sources

16. Assistance and advice have been provided to developing Member States that need to deal with disused high-activity sources. In that connection, the Secretariat is supporting the development of a shipping container design for the safe return of disused high-activity sources and for their subsequent long-term storage.

C.5. Enhancing security of high-risk radioactive sources and protecting them against malicious acts

17. Under the IAEA/RF-MINATOM/US-DOE Initiative on Securing and Managing Radioactive Sources (the Tripartite Initiative), fact-finding missions to six countries (Armenia, Azerbaijan, Belarus, Kazakhstan, Moldova and Tajikistan) have resulted in comprehensive assessments of the situation regarding the most significant radioactive sources in those countries and the identification of

options for increasing their security. Follow-up activities include the procurement of services for the dismantling and transport of disused sources to safe and secure storage facilities.

18. Following directions given by the Hofburg Conference and the guidance given in IAEA-TECDOC-1388 the Secretariat is organizing missions to Member States for the purpose of helping them to develop national strategies and associated action plans (see paragraph 13 above). So far, missions to 15 countries have been carried out, and in the case of two countries (the Philippines and Tanzania) follow-up procurement activities are taking place.

C.6. Promoting education and training

19. Regional workshops have been organized on the development of national strategies in Argentina, Bulgaria, India and Vietnam.

C.7. Response to emergencies

20. Activities related to emergency response are being carried out within the framework of implementation of the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies (see Annex 3).

C.8. Fostering information exchange

21. Significant progress is being made in the development of a new warning sign to be used in conjunction with the trefoil for dangerous radiation sources. The International Organization for Standardization (ISO) has approved a new warning sign development project, including a testing methodology, proposed by the Agency. The pre-selection of signs has been completed, and the pre-selected signs will be tested in ten countries constituting a broad cultural cross-section. Testing will begin in the third quarter of 2004 and is due to be completed early in 2005. On the basis of the test results, a new warning sign for dangerous radiation sources is expected to be proposed to ISO by April 2005. Once the sign is adopted by ISO, the Agency will update the BSS, para 1.23 (c).

C.8.1. The forthcoming International Conference on the Safety and Security of Radioactive Sources

22. Work has started on organizing an International Conference on the Safety and Security of Radioactive Sources: Towards a Global System for the Continuous Control of Sources throughout their Life Cycle. The conference will be hosted by the Government of France and will be held in Bordeaux, France from 27 June to 1 July 2005. It will provide an opportunity to review progress in improving the safety and security of radioactive sources and the experience gained through the implementation of the Code of Conduct and the Action Plan.

Radiological Protection of Patients

A. Background

1. In March 2001, the International Conference on the Radiological Protection of Patients in Diagnostic and Interventional Radiology, Nuclear Medicine and Radiotherapy took place in Málaga, Spain. In September 2001, the Board of Governors requested the Secretariat to formulate — on the basis of the Conference's findings, conclusions and recommendations — an action plan for future international work relating to the radiological protection of patients.

B. The International Action Plan for the Radiological Protection of Patients

2. In September 2002, the Board of Governors approved the International Action Plan for the Radiological Protection of Patients contained in the Attachment to document GOV/2002/36-GC(46)/12 and requested the Secretariat to implement it, subject to the availability of resources. In September 2003, the Board and the General Conference had before them, in Annex 9 to document GOV/INF/2003/15-GC(47)/INF/4, a report on progress made in implementing the Action Plan. The General Conference requested the Secretariat to keep it informed about the implementation of the Action Plan. The report presented below is a follow-up to the report contained in Annex 9 to document GOV/INF/2003/15-GC(47)/INF/4.

C. Implementation of the Action Plan

3. The Secretariat is implementing the Action Plan in collaboration with the World Health Organization (WHO), the Pan American Health Organization (PAHO), the European Commission and a number of international professional societies. The status of implementation is summarized below. A Steering Panel on the International Action Plan has been established for the purpose of keeping the various implementation activities under review, maximizing synergy and minimizing duplication. The Steering Panel, which first met in Madrid in January 2004, made a number of recommendations, which are summarized at the end of this Annex.

C.1. Actions common to diagnostic and interventional radiology, nuclear medicine and radiotherapy

C.1.1. Education and training

Action: *to complete the development of a standard syllabus and packages for training in the application of safety standards.*

Action: *to train the trainers involved in national training programmes using the above-mentioned packages.*

4. Standard syllabuses and packages for training in the application of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (the BSS) in diagnostic radiology and interventional procedures using X rays, nuclear medicine and radiotherapy have been developed and tested, and been reviewed by WHO, PAHO and the relevant international professional bodies, and feedback has been incorporated into them. Three train-the-trainers events have now been held — one for the Europe region in 2002, an interregional one in 2003 and one for Latin America in 2004, and a train-the-trainers event is being planned for East Asia and the Pacific region (to be held in November 2004).

Action: *to arrange for a review of the syllabus for the Agency training courses in medical radiation physics by appropriate professional bodies and to publish the results.*

5. The syllabus, entitled “Review of Radiation Oncology Physics: A Handbook for Teachers and Students”, was published in May 2003, and the electronic version is available on the web page of the Division of Human Health. Comments on the syllabus are being examined with a view to their being reflected in it. Endorsements of the syllabus are being sought from the relevant professional societies.

Action: *to explore the potential uses of information technology and distance learning, identifying application areas and types of information technology.¹*

6. The Steering Panel felt that the Secretariat could best implement this action by combining distance learning with use of the web platform recommended by it under “information exchange”.

Action: *to promote — through the provision of advice about the functions, responsibilities and training of technologists — recognition of the impact of technologists involved in day-to-day procedures on the radiological protection of patients.*

7. With a number of regional and national training courses, great importance was attached to ensuring the participation of technologists. Typically, one-third to one-half of the participants in the regional courses and one-half to two-thirds of the participants in the national courses were technologists.

¹ Distance learning is already being used within the Agency for education and training in nuclear medicine and radiation oncology.

C.1.2. Information exchange

Action: *to explore mechanisms for widely disseminating information related to the protection of the patient.*

8. Internal exploratory discussions on information technology for - and the legal implications of - the exchange of information via the Internet have been initiated. Consultants are meeting in August 2004 to define the detailed technical contents of a website in the light of recommendations made by the Steering Panel.

Action: *to collect and disseminate, using the Agency's International Reporting System for Unusual Radiation Events (RADEV), information about accidental medical exposures, including, as far as possible, information about events that did not have clinical consequences but from which prevention-relevant lessons can be drawn.*

9. Information about accidental exposures in radiotherapy has been collected and collated, and a draft package for the dissemination of this information has been prepared. The package has been used at five regional workshops (two for Latin America, two for Africa and one for Europe) and will be used at a regional workshop planned for East Asia and scheduled to be held in October 2004. The participants in the workshops were composed of radiotherapy staff (radiation oncologists, medical physicists and radiotherapy technologists) and regulators. The feedback from those events is being used in revising the draft package, a new version of which is expected to be available by the end of 2004.

C.1.3. Assistance

Action: *to support Member States in the gradual transition from the basic to advanced stages of implementation of the BSS.*

10. The Secretariat has developed a modular, step-by-step approach to technical assistance in the area of radiation protection in radiology and has organized missions based on this approach as a pilot exercise. The approach is being or has been applied in technical cooperation projects – for example, in Kazakhstan, Moldova, the United Arab Emirates, Egypt, Jordan, the Islamic Republic of Iran and the Libyan Arab Jamahiriya.

Action: *to promote the formal recognition of medical physicists responsible for the radiological protection of patients as health professionals.*

11. The Secretariat has been helping the International Organization of Medical Physics to identify countries that have recognized medical physicists as health professionals and thereby to gain support for an approach to the International Labour Organization regarding the recognition of medical physicists.

Action: *to continue current activities in radiotherapy concerned with the traceability of dose measurements and with audit services, including the development of local expertise, and to extend these services to diagnostic radiology and nuclear medicine.*

12. In the field of dosimetry, the Secretariat has continued providing secondary standards dosimetry laboratories (SSDLs) and hospitals in Member States with calibration and audit services relating to external beam radiotherapy, brachytherapy, mammography and radiation protection. A code of practice for dosimetry in diagnostic radiology has been drafted. In the field of nuclear medicine, a mechanism for the provision of calibration and audit services for SSDLs and hospitals is being developed.

C.1.4. Guidance

Action: *to finalize the existing draft practice-specific guidance documents, seeking input from professional bodies, international organizations and national authorities responsible for the radiological protection and medical care of patients.*

13. Three practice-specific guidance documents on implementation of the BSS in radiology, nuclear medicine and radiotherapy have been finalized - with input from professional bodies, international organizations and national authorities responsible for the radiological protection and medical care of patients. They are in the process of final editing and will soon be printed.

Action: *to provide guidance to donors, recipients and NGOs on the safety issues related to the transfer of second-hand equipment.²*

14. A group of consultants will meet later in 2004 to formulate guidance relating to the responsibilities of donors and recipients of second-hand equipment and covering issues such as acceptance tests, the availability of spare parts, and the local services required for maintenance and training.

Action: *to carry out a study on the cost-effectiveness of the various approaches to protection optimisation that reduce doses while preserving the diagnostic information and to provide guidance on priorities and strategies for implementation.*

15. The study has been initiated and the draft report — expected to be completed by the end of 2004 — will be reviewed by a group of experts and by the relevant organizations and professional bodies.

² A similar action was recommended at the International Symposium on Standards and Codes of Practice in Medical Radiation Dosimetry held in November 2002 - “WHO advice that provides guidance to organizations donating technologies to developing countries should be disseminated widely.” However, this recommendation is very general; there is a need for very specific guidance.

C.2. Specific actions in diagnostic and interventional radiology

C.2.1. Education and training

Action: *to provide for the training of radiographers and radiologists in the optimum management of doses in conventional radiology.*

16. In addition to the aforementioned train-the-trainers events, the Secretariat has organized regional and national training courses for radiographers and radiologists — and also medical physicists. Five regional training courses were held in 2002 and five in 2003, and in 2004 there are to be two regional and six national training courses.

Action: *to provide for training in the application of digital techniques for staff at facilities which are in transition from conventional to digital equipment, with a view to ensuring the proper management of patient exposure.*

17. The Steering Panel recommended that this action be changed to read “to produce training material for the transition from conventional to digital techniques, with a view to ensuring the proper management of patient exposure.” The training material is in preparation and will, in due course, be reviewed by a group of representatives of relevant organizations. The training material will be provided to professional bodies in order that they may present it at meetings, describe it in journals and use it in refresher courses.

Action: *to increase - through training and information exchange - the awareness of users of computed tomography (CT) techniques (including conventional, helical and multi-slice) regarding radiation dose and image information and to promote the use of paediatric CT protocols.*

18. The Secretariat is preparing training material in the form of PowerPoint slides on CDs. Also, it is collating radiation dose and image information which will be distributed through professional bodies.

C.2.2. Guidance

Action: *to conduct consultations with manufacturers on achieving interconnectivity of computerized imaging equipment.*

Action: *to conduct consultations with manufacturers and standards organizations on standardizing, displaying and recording data related to patient doses for CT, fluoroscopy and interventional techniques.*

19. The Steering Panel recommended that, in the consultations, the Secretariat ensure that users' requirements regarding information on patient dose, image projection and possibly age, sex and weight are met. The information format should be such as to allow the import of the data into databases such as Excel for further study and for optimization purposes. An outline requirements document was produced in March 2004 at a meeting of a group of experts with manufacturers and representatives of the International Electrotechnical Commission.

C.2.3. Appraisals and other services

Action: *to develop a methodology for establishing local guidance (reference) levels for diagnostic radiology, through simple surveys taking into account image quality, to disseminate the methodology, to promote programmes for assessing it and, during the assessments, to help countries with the conduct of quality control tests involving the use of phantoms and patient dose measurements.*

20. The methodology that has been developed is being applied in a regional project involving 11 Latin American Member States which was launched in 2004 with the collaboration of PAHO. Pilot projects on image quality improvement and patient dose reduction have been launched in Kazakhstan, Moldova, Jordan and Kuwait and will soon be launched in the United Arab Emirates and Tajikistan. Five countries in West Asia have been provided with equipment for quality control testing through one of the Model Projects on Upgrading Radiation Protection Infrastructure.

C.2.4. Coordinated research

Action: *to coordinate research work on exploring the feasibility of establishing guidance (reference) levels for complex procedures in diagnostic and interventional radiology.*

21. A coordinated research project on the feasibility of establishing guidance (reference) levels for complex procedures such as interventional radiology was launched, and the initial results for interventional cardiology procedures were reviewed at a research coordination meeting in October 2003. The review indicated that it might be feasible to establish guidance levels for the diagnostic part of the procedures but that the therapeutic part was not straightforward and the guidance levels might have to be multiplied by complexity factors. The next — and last — meeting relating to this project is planned for 2005.

C.3. Actions in nuclear medicine

Action: *to promote in developing countries — through training and the dissemination of information — the use of existing standards, guidelines, protocols and QA procedures in both diagnostic and therapeutic applications, including radiopharmacy.*

22. An IAEA Control Atlas for Scintillation Camera Systems has been published. A revision of IAEA-TECDOC-602 (Quality control of nuclear medicine instruments) is to be initiated soon. A coordinated research programme to develop a code of practice for clinical radiation measurements in nuclear medicine will be initiated in 2005.

Action: *to complete the task of developing a technical document on the quality control of PET systems.*

23. Work on the technical document is continuing, with account taken of recent technological advances (especially the combining of PET and CT images).

C.4. Actions in radiotherapy

C.4.1. Information exchange

Action: *to maintain the Directory of Radiotherapy Centres (DIRAC).*

24. Work on preparing an Internet version of the Directory of Radiotherapy Centres (DIRAC), an Agency-WHO database, is continuing.

C.4.2. Assistance

Action: *to follow up on abnormal results of the postal dose quality checks and assist in the establishment of national and regional dosimetry programmes.*

25. The Secretariat has continued to follow up on abnormal results of postal dose quality checks and to assist in the establishment of national and regional dosimetry programmes, in line with the Steering Panel's view that the activities in question are important and should continue.

C.4.3. Guidance

Action: *to continue to develop and disseminate codes of practice for dosimetry.*

26. WHO, PAHO and the European Society of Therapeutic Radiology and Oncology have endorsed the International Code of Practice for Dosimetry Based on Standards of Absorbed Dose to Water developed by the Secretariat (Technical Reports Series No. 398). To provide practical guidance on the implementation of the International Code of Practice at hospitals, the Secretariat has continued working on preparing a technical document (IAEA-TECDOC) on the testing of the procedures recommended for using different types of radiation beams and ionization chambers and comparing the results obtained with the existing protocols. The Secretariat has organized further regional workshops, in Latin America and East Asia, on practical aspects of implementing the International Code of Practice at hospitals and SSDLs.

Action: *to develop guidance on commissioning equipment and accessories involved in simulation and treatment, including TP systems, and on QA of the whole radiotherapy process.*

27. The Secretariat has prepared a guidance document on the commissioning and quality assurance of computerized radiation treatment planning systems that is being circulated for comment. Work on revising IAEA-TECDOC-1040 (entitled "Design and implementation of a radiotherapy programme: Clinical, medical physics, radiation protection and safety aspects" and published in 1998) is continuing.

Action: *to facilitate the critical review of research on biological methods of assessing absorbed dose and to disseminate information about such research (radiotherapy).*

28. The Steering Panel recommended that this action be removed from the Action Plan, but, given the fact that the Secretariat is preparing a coordinated research programme which is related to this action, implementation of the recommendation has been postponed pending the next meeting of the Steering Panel.

C.5. Recommendations of the Steering Panel

Training

Recommendation

The Agency's education and training material should be more widely disseminated, particularly through professional societies, in order to reach the large number (millions in the case of diagnostic radiology) of professionals who need it.

Steps taken

The international professional societies participating in implementation of the Action Plan have reviewed and endorsed the education and training material, and some national professional societies have been contacted with a view to their drawing attention to the material in their official journals and making CD copies for distribution to their members.

Recommendation

Ways should be found to train clinicians who may use ionizing radiation in their work but have not received formal radiation protection training (e.g. cardiologists).

Steps taken

In May 2004, the Secretariat held a radiation protection training course for interventional cardiologists from 25 countries — the first such course in which cardiologists from so many countries have participated. The participants focused on radiation protection in common cardiac interventions such as angioplasty of the coronary arteries, stent implantation and radiofrequency ablation.

Information exchange

Recommendation

High priority should be given to the use of the Internet (through a web platform) for information exchange with large numbers of medical and paramedical professionals. The items to be considered for inclusion on the web platform should include: training material, statements by authoritative groups, Agency standards and guidance, the results of surveys of patient doses for certain procedures, and quality control protocols.

Recommendation

A group of experts should be appointed to advise on the specifications of the web platform. Consideration should be given to the identification of keywords for facilitating access to the web platform (e.g. a search for "pregnancy and medical radiation" should lead to the web platform via an appropriate web search engine).

Occupational Radiation Protection

A. Background

1. An *International Conference on Occupational Radiation Protection* took place at the Headquarters of the International Labour Organization (ILO), Geneva in August 2002 (the Geneva Conference). It was organized by the Agency, which convened it jointly with ILO, co-sponsored by the European Commission and held with the co-operation of the World Health Organization and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development and also of the United Nations Scientific Committee on the Effects of Atomic Radiation, the International Commission on Radiological Protection, the International Commission on Radiation Units and Measurements, the International Electrotechnical Commission, the International Radiation Protection Association and the International Society of Radiology. The Geneva Conference recommended that the Agency and ILO formulate and implement an international action plan for occupational radiation protection.

B. The International Action Plan for Occupational Radiation Protection

2. On 8 September 2003, the Board of Governors approved the International Action Plan for Occupational Radiation Protection contained in Annex 2 to document GOV/2003/47-GC(47)/7 and requested the Director General to implement it in cooperation with the Secretariat of ILO.¹ Before being submitted to the Board, the draft Action Plan, which had been prepared by the Agency and ILO Secretariats, was reviewed by the other organizations involved in the Geneva Conference and by the International Confederation of Free Trade Unions and the International Organisation of Employers. In resolution GC(47)/RES/7.A, the General Conference welcomed the Board's approval of the International Action Plan and requested the Director General to keep it informed of its implementation.

C. Implementation of the Action Plan

3. The Secretariat is implementing the Action Plan in collaboration with the ILO Secretariat and a number of international professional societies. The status of implementation is summarized below. The Secretariats of the Agency and ILO have established a Steering Committee comprising representatives of several interested States and international organizations to advise on, monitor and assist in the implementation of the Action Plan. The first meeting of the Steering Committee was held,

¹ See document GOV/OR.1076, paras 159 and 160.

in Vienna, from 4 to 6 February 2004. At that meeting, the Steering Committee considered the actions making up the Action Plan and set priorities. The Agency and ILO Secretariats undertook to prepare a work schedule with milestones and targets in order to assist the Steering Committee in monitoring progress. The Steering Committee agreed that it would meet at intervals of 12-18 months.

C.1. ILO Convention 115

4. ILO's responsibility for occupational safety and health is discharged in the radiation protection area through the promotion of ILO Convention 115, 'Protection of workers against ionising radiations', which has so far been ratified by 47 countries. ILO, which is a co-sponsor of the *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (the BSS), uses the requirements for occupational radiation protection embodied in the BSS as the basis for assessing compliance with Convention 115. Many documents on occupational radiation protection published by the Agency in support of the BSS are also co-sponsored by ILO.

Action: *ILO, supported by the IAEA, to take steps to further promote the ratification and implementation of ILO Convention 115.*

5. At its first meeting, the Steering Committee took up the question whether, given the increasing use being made of transient workers, of self-employed workers and of persons working in countries and establishments far from their places of residence, ILO Convention 115 needed to be revised. However, ILO's Governing Body had previously concluded that the Convention was still relevant in its current form, and the ILO Secretariat has no plans for its revision.

6. As a first step towards further promoting the Convention, the agendas of coordination meetings of countries participating in the Agency's Model Project on upgrading regulatory infrastructures (in which 92 Agency Member States are currently participating) now include a presentation of the Action Plan, thus bringing ILO Convention 115 to the attention of the participants in those meetings.

Action: *ILO to consider whether there is a need to review the procedures for requesting from Member States information on the implementation of ILO Convention 115 and to review the types of information being requested, so that peer reviews of occupational radiation protection programmes become more effective. Lessons learned from the application of the reporting criteria applied under the Convention on Nuclear Safety (IAEA document INFCIRC/449) may be a useful input.*

7. The Agency's Occupational Radiation Protection Appraisal Service (ORPAS) makes use of a detailed checklist for appraising all aspects of occupational radiation protection in countries hosting ORPAS missions. There are similarities between ORPAS and the mechanism used by ILO to assess compliance with Convention 115, and the two organizations are therefore coordinating their efforts in this area. Over the past year, several ORPAS missions have been planned or have been the subject of discussions with Member States. For a forthcoming mission to Turkey, ILO has been formally invited to collaborate with the Agency in identifying a suitable expert to form part of the appraisal team. Proposed missions to Azerbaijan, Ukraine and Bolivia will also involve collaboration with ILO.

Action: *The IAEA and ILO to continue to cooperate in the development of guidance and informatory material that will assist in the interpretation of requirements set out in conventions and standards, and in the conduct of further IAEA intercomparisons of monitoring methods for assessing occupational exposure.*

8. Safety Reports on Radiation Protection against Radon in Workplaces other than Mines and on Occupational Radiation Protection in the Mining and Processing of Raw Materials were published by the Agency in November 2003 and April 2004 respectively; both publications were co-sponsored by ILO. In January 2004, the Agency published the French language versions of two Safety Guides co-sponsored by ILO — Occupational Radiation Protection and Assessment of Occupational Exposure due to External Sources of Radiation (published in English in 1999); the Spanish language versions of these two Safety Guides were published in February 2004.

9. Other recent Agency publications were related to occupational radiation protection have been brought to the attention of ILO. They include a Safety Report on *Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry* (published in November 2003) and a series of four Practical Radiation Technical Manuals on the topics of workplace monitoring, individual monitoring, health effects and medical surveillance, and personal protective equipment (published in April 2004). The Russian language version of the Safety Report *Optimization of Radiation Protection in the Control of Occupational Exposure* (published in English in 2002) was published in October 2003, followed by the French language version in November 2003.

10. Intercomparisons to assist Member States in complying with dose limitation requirements and to harmonize the use of internationally agreed quantities and assessment methods are at various stages of implementation²:

11. The knowledge gained from the establishment of a quality management system for the Agency's own monitoring operations has been used in developing a training course on *Quality Management Systems for Technical Services in Radiation Safety*. This training is aimed at providing Member States not only with the technical skills needed for radiation protection monitoring and evaluation but also with the necessary reliability of results. Some of the many intercomparison exercises that have been

² Earlier intercomparisons, conducted by the Agency from 1987 onwards, included, for external dosimetry, the impact of the possible adoption of a new set of operational quantities introduced by the International Commission on Radiation Units and Measurements and the performance of personnel dosimetry services when the operational quantity $H_p(d)$ is used and, for internal dosimetry, intercalibrations of facilities with different sets of phantoms simulating the human body, of methods for measuring radionuclides in human excreta, and of dose estimation methodologies. The state of implementation is as follows: Measurements of the quantity 'activity' of radionuclides in simulated human organs (38 Member States, 70 laboratories, 4 phantom types). Measurements of the quantity 'personal dose equivalent $H_p(10)$ ' for mixed neutron-photon radiation fields, in two steps: a type-test intercomparison followed by a simulated work place intercomparison. For the former step, only 10 Member States' laboratories out of 31 reported satisfactory results — such deficiencies clearly reveal the need for the causes of the discrepancies to be investigated in detail. Measurements of $H_p(10)$ in photon fields, in cooperation with the European Radiation Dosimetry Group, to evaluate the suitability of modern 'active personal dosimeters' for standards compliance purposes. This exercise will show whether these electronic direct readout instruments are ready to be used in place of passive devices such as film badges or thermoluminescent detectors. Measurements of $H_p(10)$ in the East Asia region under a regional cooperation agreement. The third phase was concluded in mid-2004. There was a clear improvement from the first to the second phase and the laboratories demonstrated good performance in both quantities tested — the results in the second phase were satisfactory for all 11 participating Member States. This regional approach has found to be useful for the determination of quantities used in workplace monitoring and internal dosimetry. Measurements of $H_p(10)$ in the Latin America region. The second phase was concluded in mid-2004. Again, there was a clear improvement from the first to the second phase — during the second phase, 11 of the 15 participating laboratories fulfilled the performance criteria. Corrective actions have been recommended for the four remaining countries. Measurements of $H_p(10)$ in photon fields in the West Asia region under technical cooperation Model Project RAW/9/008 (24 services from 12 countries). Different types of photon fields in various combinations are being assessed — the first of two phases is complete and the results are being collected and evaluated.

conducted have revealed significant differences in approaches, methods and assumptions, and consequently in the results achieved. The participants in such exercises have recognized the importance of the exercises as a means of providing evidence of good dosimetric performance for their quality management systems and related laboratory accreditation processes. They have strongly urged that the Agency continue to act as a focal point for fostering exchanges of information on and training in dosimetry techniques. The Agency's Secretariat intends to play an active role in the establishment of a network of laboratories involved in dosimetry for radiation protection purposes.

C.2. The ILO code of practice on “Radiation protection of workers (ionising radiations)”

Action: ILO, in consultation with the IAEA, to consider the concerns over the terminology used in the code of practice and determine the most appropriate means of addressing them.

12. The Agency and ILO Secretariats have identified an expert to be hired by ILO to carry out a review of the code of practice.

C.3. Co-operation between the IAEA and ILO in reaching developing countries

Action: ILO to make the list of contact points in its Member States and field structure available to the IAEA, which should inform the contact points about the latest available standards, guidance and advice developed at the international level and invite their representatives to relevant workshops, seminars and conferences.

13. The ILO Secretariat has provided the Agency Secretariat with worldwide lists of ILO offices and ILO Senior Occupational Health and Safety Specialists. The offices and specialists (some in countries that are not Member States of the Agency) are to be used by the Agency Secretariat as contact points for the dissemination of information on subjects of potential interest – for example, intercomparison exercises and training courses. The Agency's web pages on occupational radiation protection are being made more user friendly and adjusted so that more detailed information can be provided.

C.4. Information exchange to promote greater awareness and understanding

Action: The IAEA, in consultation with ILO, to develop publicity materials in the form of posters and leaflets that target groups of workers identified as likely to benefit directly from the information provided — for example, workplace material designed to reduce the number of near misses and the risk of serious accidents.

14. The Steering Committee identified several organizations producing publicity materials that the Agency and ILO Secretariats will review and build upon where appropriate.

Action: *The IAEA to provide a focal point, on a website, where networks may be established for exchanges of information, experience and lessons learned between interested parties.*

15. The Steering Committee identified several initiatives that could be taken into account in the establishment of a focus for any new initiative and in the designing of a suitable networking arrangement.

C.5. Education and awareness

Action: *The IAEA, in consultation with ILO and drawing on the experience of trade unions and other stakeholder organizations, to prepare and disseminate suitable information materials to workers' representatives and labour educators in order to promote a better informed workforce and better understanding generally among those concerned with exposure to radiation.*

16. The Steering Committee identified several organizations producing training, education and awareness materials that will be reviewed by the Agency Secretariat as possible useful inputs.

Action: *The IAEA, in consultation with professional medical bodies such as the International Society of Radiology, to critically examine existing postgraduate education and awareness-raising packages for medical professionals, including those now being produced by ICRP, to establish the need for the development of further material, to develop further material as necessary and to disseminate the material developed.*

17. The Steering Committee identified some additional organizations producing education and training materials that, although primarily concerned with patient protection, also cover aspects of occupational radiation protection and therefore need to be examined.

Action: *The IAEA, together with other co-sponsoring organizations, to engage with the WHO in establishing the status of the draft Manual [on Radiation Protection in Hospitals and in General Practice], and to encourage its finalization, publication and use as soon as possible.*

18. WHO has agreed that the Agency should assume responsibility for the finalization of the draft Manual, which has reached an advanced stage of development but needs to be updated.

C.6. Exposure to enhanced natural radiation in the workplace

19. On the basis of recommendations made at a technical meeting held in May 2001, the Agency Secretariat has already initiated a programme of work on exposure to natural radiation.

Action: *In support of this programme, the IAEA to assist authorities in identifying activities involving exposure to natural radiation that may need to be controlled, and to generate and disseminate additional sector-specific information on radioactivity levels, exposure conditions, and chemical and physical characteristics of airborne pollutants in workplaces involving naturally occurring radioactive material.*

20. Work has started on the development of practical, step-by-step guidance that can assist Member States in the identification of activities involving exposure to natural radiation and their preliminary

assessment in terms of the possible need for control measures. The recently published Safety Report on *Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry* pays considerable attention to the protection of oil and gas industry workers against natural sources of radiation. A draft of the Safety Report was used as the basis for the development, during 2003, of a training package for the oil and gas industry aimed at: regulatory bodies; oil and gas field operators and support companies; workers and their representatives; safety, health and environmental protection professionals; and health and safety training officers. The training package was presented at a regional training course in Port Harcourt, Nigeria, in December 2003 (for the Africa region) and at an interregional training course in Jakarta, Indonesia, in May 2004 (for the Europe and East and West Asia regions) that were attended by almost 60 trainees. The development of three further Safety Reports on specific industries involving occupational exposure to natural radiation (the phosphate industry, the zircon industry and the titanium minerals industry) is continuing with the help of consultants.

C.7. Promotion of a holistic approach to workplace safety

Action: *The IAEA and ILO to collaborate in devising strategies for achieving a better understanding between radiation protection practitioners on one hand and occupational health and safety practitioners on the other and for developing coherent approaches to safety in the workplace.*

21. The Steering Committee identified some areas in which experience with a holistic approach might exist and possible mechanisms for sharing and building upon such experience. ILO, whose approach to occupational health and safety was already holistic, has agreed to assume the main responsibility for this action.

C.8. Formulation and application of standards for protection of pregnant workers and their embryos and fetuses

Action: *The IAEA to review current information on this issue in order to determine whether the issue warrants action at the international level. In addition to the work described in the presentations made at the Geneva Conference, relevant work has been done in a number of countries and by a number of bodies (such as ICRP).*

22. The Steering Committee identified past and present work in this area that needs to be examined by the Agency Secretariat.

C.9. Probability of causation of occupational harm attributable to radiation exposure

Action: *The IAEA, in collaboration with ILO, WHO, NEA and other relevant bodies and drawing on the experience of other stakeholders, to continue its work on developing international guidance for aiding decision-making on the attribution of cases of detrimental health effects to occupational exposure to ionizing radiation.*

23. A comprehensive draft report on *Attributing Radiation-Linked Diseases to Occupational Exposure* prepared by a group of consultants in October 2003 is being examined by the ILO and WHO Secretariats. A revised draft will be circulated to other stakeholders in preparation for a technical meeting planned for 2005, to which a broad spectrum of international experts and interested organizations will be invited with a view to the formulation of guidance for decision-makers involved in compensation schemes for occupational diseases.

Protection of the Environment from the Effects of Ionizing Radiation

1. In 2002 and 2003, in resolutions GC(46)/RES/9.A and GC(47)/RES/7.A, the General Conference stated that it welcomed the steps taken by the Secretariat to assist in developing an international framework for the protection of the environment from the effects of ionizing radiation and that it looked forward to the *International Conference on the Protection of the Environment from the Effects of Ionizing Radiation* which was to take place in Stockholm from 6 to 10 October 2003.

2. The International Conference was attended by about 220 participants from 38 countries and 11 organizations. The participants included senior policy-makers and technical experts from a wide range of backgrounds reflecting all interests in environmental assessment and management.

3. The primary objective of the International Conference was to promote the development of a coherent international policy regarding protection of the environment from effects attributable to ionizing radiation exposure. The findings of the Conference took the form of a report by its President, available at the address:

<http://www-ns.iaea.org/meetings/rw-summaries/stockholm.htm>.

4. The International Conference reviewed recent developments, considered their implications for future work on formulating guidance at the national and the international level and clarified the responsibilities of the various international organizations that will be involved in that work – notably, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the International Commission on Radiological Protection (the ICRP) and the Agency: UNSCEAR should continue to provide findings on the sources and effects of ionizing radiation that can be utilized as the authoritative scientific basis for the future international efforts in environmental radiation protection; the ICRP should continue to issue recommendations on radiation protection, including specific recommendations for the protection of non-human species; and the Agency should establish the appropriate international undertakings for restricting releases of radioactive materials into the environment over time so as to protect humans and the non-human component of the environment and should continue to foster information exchange. Also, the International Conference concluded that the involvement of a broad stakeholder community, including intergovernmental organizations and non-governmental organizations, was essential for identifying possible gaps in the evolving environmental radiation protection system and for increasing the understanding and acceptance of relevant recommendations.

5. The International Conference recommended that, under the aegis of the Agency, an international action plan on the protection of the environment against the detrimental effects attributable to radiation exposure be prepared and submitted to governments for approval. All relevant international organizations and senior experts from States should be invited to contribute to the preparation of such an action plan.

6. Pursuant to the International Conference's findings, the Secretariat prepared the draft of an International Action Plan on the Radiation Protection of the Environment that was examined and revised at a technical meeting in June 2004. Senior experts from the following Member States participated in the technical meeting: Australia, Belgium, Belarus, Canada, China, Finland, France, India, Indonesia, Iraq, Japan, Luxembourg, Mexico, the Russian Federation, Spain, Sweden, the United Kingdom and the United States of America. The Nuclear Energy Agency of the Organisation

for Economic Cooperation and Development, the Organization for Security and Cooperation in Europe, the ICRP, the International Union of Radioecology, UNSCEAR and the World Nuclear Association also sent participants. The resulting draft Action Plan has been submitted for comment to the Agency's Member States, and it is expected that a final draft will be submitted to the Board of Governors for approval in March 2005.

Safety of Radioactive Waste Management

A. Background

1. Following the adoption of the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management (the Joint Convention) in September 1997, the Agency, in co-operation with the European Commission, the Nuclear Energy Agency of the Organisation for Economic and Co-operation and Development (OECD/NEA) and the World Health Organization, organized the International Conference on the Safety of Radioactive Waste Management that took place in Córdoba, Spain, in March 2000 (the Córdoba Conference). Subsequently, the Agency, in co-operation with the European Commission and OECD/NEA, organized the International Conference on Issues and Trends in Radioactive Waste Management that took place in Vienna in December 2002 (the Vienna Conference).

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

2. The Joint Convention entered into force in June 2001. The first Review Meeting of Contracting Parties to the Joint Convention took place in November 2003. An account of the Review Meeting is given in paragraphs 56-59 of document GC(48)/INF/3 (the Nuclear Safety Review for the Year 2003), in which two matters are highlighted — namely; the need for some improvements to the working arrangements for the Joint Convention and the adoption of measures to promote the Joint Convention.
3. At a meeting of the General Committee for the Joint Convention held in June 2004, improved arrangements — based on experience gained at the first Review Meeting — were recommended for adoption by the next meeting of Contracting Parties.
4. Agency staff members have made presentations promoting the Joint Convention at a number of international meetings and at various Agency regional workshops and other events.

C. The International Action Plan on the Safety of Radioactive Waste Management

5. Following the Córdoba Conference, the Secretariat proposed (in the *Report on the Safety of Radioactive Waste Management* contained in the Attachment to document GOV/2001/31-GC(45)/14) to implement seven actions for enhancing the safety of radioactive waste management. In September 2001, the Board of Governors requested the Secretariat to implement those actions. Progress in implementing the actions was described in Attachment 5 to document GOV/2002/35-GC(46)/11, which was before the General Conference at its 2002 session. The list of actions was subsequently updated in the light of the deliberations of the Vienna Conference, resulting in an international Action

Plan on the Safety of Radioactive Waste Management consisting of nine actions (see, in this connection, Annex 7 to document GOV/INF2003/15-GC(47)/INF/4 and paragraph 24 of General Conference resolution GC(47)/RES/7.A).

D. Implementation of the Action Plan

6. The progress made in implementing the Action Plan is described below.

Action 1: *Develop a common framework for the management and disposal of different types of radioactive waste, paying particular attention to large volumes of waste containing long-lived naturally occurring radionuclides.*

7. A document with proposals for a common framework and its application was reviewed by the Subgroup on Principles and Criteria of the Agency's Waste Safety Standards Committee (WASSC) in 2002. Particular issues raised were the optimum approach for the disposal of non-heat-generating long-lived radioactive waste and the need for international consensus on appropriate disposal options for such waste. In October 2003, the document was presented to the US National Academies' Committee on Improving the Regulation and Management of Low Activity Radioactive Waste, which concluded that a common framework would be of considerable assistance in the development of consistent approaches to the management of radioactive waste. The document, which is expected to be published towards the end of 2004, will be used as a working document in the revision of the safety standard on radioactive waste classification and in the consideration of appropriate disposal options for large amounts of low-level waste, including low-level waste containing naturally occurring radionuclides.

Action 2: *Assess the safety implications of the extended storage of radioactive waste and of any future reconditioning which may be necessary and develop safety standards for the long-term storage of radioactive waste.*

8. A position paper prepared by international experts and entitled "The long-term storage of radioactive waste: safety and sustainability" was published by the Agency in 2003. The document, which reviews the ethical and philosophical issues surrounding the extended storage of radioactive waste, is intended as an international reference point for discussions on the subject and as an aid to Member States in taking decisions on the long-term management of radioactive waste.

9. The Safety Guide on the storage of radioactive waste has been reviewed by Member States and is undergoing revision on the basis of comments received.

10. An international project on the safety assessment of waste management prior to disposal is scheduled to commence towards the end of 2004, one component of the project being the safety assessment of long-term storage.

Action 3: *Promptly develop safety standards for geological disposal, addressing inter alia – issues of human intrusion, institutional control, retrievability, the content of the safety case and any implications of nuclear safeguards requirements for the design of the repositories.*

11. A draft Safety Requirements document on geological disposal has been prepared. In view of its importance and of the need to obtain the fullest possible international consensus on its contents, OECD/NEA was invited to co-sponsor it. The draft was reviewed by Member States in 2003 and revised by the Secretariat to take account of the comments received. WASSC and the Radiation Safety Standards Committee (RASSC) and the Radioactive Waste Management Committee of OECD/NEA have now subsequently approved the standard, which will be submitted to the Agency's Commission on Safety Standards and to OECD/NEA's Steering Committee.

12. Work has started on a supporting safety guide which will elaborate on the safety considerations involved in disposal facility site investigation, characterization and selection, facility design and development, and facility operation and closure. The safety guide will also elaborate on the requirements for a safety case specified in the Safety Requirements document and on the need to demonstrate that any measures facilitating retrievability will not have an adverse impact on safety.

13. The Safety Requirements document addresses — and the safety guide will address — the safety implications of safeguards implementation at geological disposal facilities, and liaison is being maintained with the Agency's Department of Safeguards and with safeguards experts in concerned Member States.

Action 4: *Develop an internationally accepted and harmonized approach for controlling the removal of materials and sites from regulatory control.*

14. A safety guide on the principles of exclusion, exemption and clearance has been approved by WASSC, RASSC and the Commission on Safety Standards; it will be published towards the end of 2004. Safety guides relating to the removal of materials and sites from regulatory control are being developed. Complementary safety reports are under development, one on monitoring for compliance with clearance criteria and one on the removal of sites from regulatory control. Both documents are scheduled for publication in 2005. (See in this regard document GOV/2004/54-GC(48)/8).

Action 5: *Develop a structured and systematic programme to ensure adequate application of the Agency's waste safety standards and facilitate their application in implementation of the Joint Convention.*

15. The existing approaches for evaluating the use made and the effectiveness of the waste safety standards are being analysed with the intention of improving the arrangements for providing safety-related assistance, peer review services and education and training.

16. A comprehensive syllabus for training in radioactive waste safety has been drawn up on the basis of the waste safety standards, and training packages are being created. A worldwide programme of training events is in place, covering all aspects of waste management and with emphasis on safety assessment and decommissioning.

17. A series of questionnaires has been developed on the basis of the waste safety standards in order to assist in the appraisal of the standards, their use and effectiveness. The series includes a questionnaire that can be used by States when preparing or reviewing reports required under the Joint Convention.

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

18. A draft document has been prepared on the use of archiving as a means of preserving knowledge about radioactive waste disposal facilities for future generations. The proposals in it have been successfully tested in relation to the recording of the results of a safety assessment at a near-surface repository. It has been reviewed at a technical meeting and is being revised by the Secretariat in the light of comments made there. It emphasizes the need to maintain the information context - as well as the information itself - relating to the safety of facilities and the need to adopt the recently developed international standards on archives. The document will be published towards the end of 2004.

Action 7: *Address the broader societal dimensions of radioactive waste management by:*

- *Disseminating information, in appropriate formats and by appropriate means (including the Internet), on the main issues related to radioactive waste management;*
- *Disseminating information on lessons learned from national experiences of stakeholder involvement in decision-making;*
- *Involving concerned persons in relevant Agency activities, especially those related to the Agency's safety standards; and*
- *Ensuring that the societal aspects of radioactive waste management are adequately covered at relevant conferences and other meetings organized by the Agency.*

19. This action has been addressed at a number of meetings. For example, in December 2002, at the International Conference on Issues and Trends in Radioactive Waste Management, there were sessions on the involvement of concerned persons (stakeholders) in and public attitudes towards radioactive waste management, with a variety of concerned persons participating, and in 2003 a meeting was held for the purpose of eliciting the views of stakeholders about the way in which the Agency's radioactive waste safety standards are developed and the content of those standards.

20. While there is support for the Agency's involving stakeholders to a greater degree in Agency activities related to radioactive waste management and for the Agency's role in disseminating relevant information, most Member States do not wish to see the Agency involving itself more directly in matters related to the social dimensions of radioactive waste management.

21. The idea of inviting a broad range of stakeholders to attend meetings of WASSC as observers is being considered, the intention being to make the process of international safety standards development more comprehensible to stakeholders.

Action 8: *Review the new developments related to policies for the control of radioactive discharges to the environment, taking into account the availability and cost-effectiveness of discharge reduction technologies and the broader implications for radioactive waste management of reducing discharges.*

22. A technical document (IAEA TECDOC) on the regulatory control of radioactive discharges is in preparation, its purpose being to provide an overview of current regulatory practices related to the control of radioactive discharges in Agency Member States, of issues of general concern which may influence future regulatory practices and of related work being done by the Agency and other organizations.

Action 9: *Explore international mechanisms for facilitating the management of spent sealed radioactive sources through:*

- *The return of such sources to their suppliers;*
- *The development of regional repositories for the disposal of such sources; and*
- *Studies on the feasibility and safety of the borehole disposal concept.*

23. A safety guide covering the design and operation of borehole disposal facilities is being developed. A first draft was discussed in March 2004 at a WASSC meeting, where it was agreed that the safety guide should focus on intermediate-depth narrow-diameter boreholes intended primarily for the disposal of disused sealed sources. The draft is being revised accordingly. A complementary safety report on the generic safety assessment of borehole disposal facilities is also being developed.

Decommissioning of Nuclear Facilities

A. Background

1. The International Conference on Safe Decommissioning for Nuclear Activities: Assuring the Safe Termination of Practices involving Radioactive Materials took place in Berlin from 14 to 18 October 2002. Reporting on the International Conference in Annex 8 to document GOV/INF/2003/15-GC(47)/INF/4, the Secretariat stated that it was preparing a draft action plan which elaborated on the ideas contained in the report of the International Conference's President. The General Conference, in resolution GC(47)/RES/7.A, urged the Secretariat "to submit a finalized action plan to the Board for approval as soon as possible in 2004".

B. The International Action Plan on the Decommissioning of Nuclear Facilities

2. In June 2004, the Board of Governors approved an international Action Plan on the Decommissioning of Nuclear Facilities that was contained in Annex 2 to document GOV/2004/40 (Corrected) and is now available on the Agency website:

<http://www-ns.iaea.org/downloads/rw/action-plans/decomm-action-plan.pdf>

Education and Training in Nuclear, Radiation, Transport and Waste Safety

A. General

1. In September 2003, in resolution GC(47)/RES/7.A, the General Conference — which had before it the report contained in Annex 3 to document GOV/INF/2003/15-GC(47)/INF/4 — underlined the fundamental importance of education and training in nuclear, radiation and transport safety and waste management, welcomed the continued implementation of the Strategy for Education and Training in Nuclear Safety and the Strategic Plan for a Long-Term and Sustainable Programme of Education and Training in Radiation Safety and Waste Management, and urged the Secretariat to continue to strengthen its efforts, subject to the availability of resources, in the education and training area, and in particular to assist Member States in the preparation of training materials in the official languages of the Agency.

B. Nuclear safety

2. In continuing to implement the Strategy for Education and Training in Nuclear Safety, the Secretariat has drawn up a long-term plan for ensuring that there are sustainable programmes for education and training in nuclear safety in all relevant Member States by the end of the decade. The expected outcomes are: national and regional centres providing training in line with the Agency's nuclear safety standards; and standardized training materials for use by lecturers and trainees (in English and other languages). Activities carried out by the Secretariat since the 2003 session of the General Conference in pursuing those outcomes are described below.

3. A two-week course on training methodologies, training course organization and the use of training materials developed by the Secretariat was conducted in the United States of America. The course was oriented to professionals from Europe and East Asia engaged in human resources development, including the planning, design and conduct of education and training events.

4. Within the framework of the Agency's extrabudgetary programme on the safety of nuclear installations in South-East Asian, Pacific and Far East countries, a two-week version of the Basic Professional Training Course on Nuclear Safety was conducted in Indonesia and Vietnam. Local experts, using training materials prepared by the Secretariat, gave most of the lectures, and the two-week courses may be regarded as steps towards the establishment of sustainable training programmes.

5. Within the framework of the same extrabudgetary programme, a regional workshop was held in Japan to assist in the development of sustainable programmes of training in nuclear safety and to exchange information among trainers. The workshop also served as a follow-up to education and training review missions to Indonesia, Malaysia, Thailand and Vietnam and to a workshop held in China.

6. Also within the framework of that extrabudgetary programme, work continued on the establishment of a network of training centres through which experience and training materials can be

shared. The network is now in operation, with a database into which training materials developed by the Secretariat and other participating organizations are being entered. Procedures are being developed for ensuring the quality of the materials distributed through the network.

7. Work also continued on the development of standard training packages — documents designed to help training centres with the organization of training events and to help lecturers with the preparation of their presentations. In addition, modules for training in self-assessment at nuclear power plants and for training in Level-2 probabilistic safety assessments were recently issued.

8. Distance learning tools for self-study were created in two formats: (i) hypertext modules; and (ii) multi-media materials for synchronized video and PowerPoint presentations. For the first format, a hypertext training module on the operational safety of nuclear power plants was prepared. For the second format, the preparation of a series of presentations covering recently issued nuclear safety related standards and other documents was initiated; the subjects covered so far are the commissioning of nuclear power plants, the evaluation of seismic hazards for nuclear power plants, external events (excluding earthquakes) in the design of nuclear power plants, fire safety, fuel handling and storage systems, modifications to nuclear power plants, site evaluation for nuclear installations and the Code of Conduct for the Safety of Research Reactors.

9. In addition to activities carried out pursuant to the long-term plan, the Secretariat continued to organize regular training courses and workshops (about 50 in 2003 — mostly designed to inculcate the principles of safety at nuclear installations). In particular, a training course on the regulatory control of nuclear power plants was held in Germany and one on the safety assessment of nuclear power plants to assist in decision-making was held in Spain, both within the framework of the Agency's technical cooperation programme for the Europe region. The six-week Basic Professional Training Course on Nuclear Safety held each year in France is not being held this year as its format is being reconsidered.

C. Radiation, transport and waste safety

10. In continuing to implement the Strategic Plan for a Long-Term and Sustainable Programme of Education and Training in Radiation and Waste Safety, the Secretariat organized the second meeting of the Steering Committee that oversees and advises on the implementation of the Strategic Plan, which took place in November 2003.¹

11. In addition, the Secretariat continued to organize train-the-trainers workshops. Three such workshops were conducted in 2003 in Europe and Latin America, on radiation protection and safety in industry and medicine.

12. Postgraduate educational courses (PGECs) in radiation protection and the safety of radiation sources were held at regional centres in Argentina (in Spanish), Malaysia (in English), the Syrian Arab Republic (in Arabic) and Morocco (in French). The PGECs, based on the Secretariat's Standard

¹ The members of the Steering Committee represent regional, collaborating and national training centres, the European Commission and the International Radiation Protection Association. At the November 2003 meeting it was concluded that a great deal of progress had been made in the development of an inter-centre network, in the creation of training modules and in the development of training mechanisms such as on-the-job training and e-learning and that the key milestones for 2003 - for example, the development of train-the-trainers courses and of training packages - had been achieved.

Syllabus, were attended by about 80 participants. The Standard Syllabus, published in 2002 in English under the symbol TCS-18, has now been published in French and Spanish under that symbol.

13. A number of workshops and other specialized training events relating to radiation, transport and waste safety were organized within the framework of the Model Projects on Upgrading Radiation Protection Infrastructure in Africa, East Asia and the Pacific, Europe, Latin America and West Asia and of RCA, AFRA and ARCAL projects. There were five regional training events on radioactive waste safety, ten on radiation protection in medicine, eight on regulatory inspections and control, six on emergency response, two on occupational radiation protection and one on the safe transport of radioactive material. Interregional workshops on radiation protection and radioactive waste management in the oil and gas industry and on radiation protection for interventional cardiologists were held for the first time. Fifteen national training courses covering emergency response, radiation safety in diagnostic radiology, radioactive waste management and other subjects were supported by the Agency.

14. To ensure that the training provided through the Agency is in line with the Agency's safety standards, the Secretariat completed the development of training packages relating to the assessment of occupational exposures due to intakes of radionuclides, the assessment of external occupational exposures, the safe transport of radioactive material, medical preparedness for and response to radiological emergencies, the safety assessment of near-surface low- and intermediate-level radioactive waste disposal facilities and other topics and submitted them to the Steering Committee for review. Training packages on 25 topics were reviewed by the Steering Committee, and the comments made by it and feedback from field trials are now being taken into account by the Secretariat in revising the training packages. In addition, training packages were provided to Member States on request.

15. Secretariat staff participated in a European Union workshop on the initiation of a European Radiation Protection Training and Education Platform and presented the Agency's strategic approach to education and training in radiation, transport and waste safety. The participants in the workshop unanimously agreed that all the syllabi and training packages prepared by the Secretariat should be used as references by European Union member countries, being adjusted to their individual needs whenever necessary. Also, they recommended that cooperation and coordination between the Agency and the European Union be strengthened in order to avoid duplication and optimize the use of resources.

16. The Secretariat submitted a 'Template for a National Training Programme' and a report on the harmonization of on-the-job training in radiation protection to the Steering Committee, which welcomed them. In addition, the Steering Committee welcomed proposals relating to e-learning, inter-centre networking and the appraisal of education and training and recommended that the Secretariat implement them.

17. Tables showing the regional workshops and other training events held during the period August 2003–July 2004 and the training modules that have been developed by the Secretariat will be provided by the Department of Nuclear Safety and Security on request.

Nuclear and Radiation Safety Networks

A. Asian Nuclear Safety Network

1. Within the framework of the Agency's extrabudgetary programme on the safety of nuclear installations in South-East Asia, Pacific and Far East countries, an Asian Nuclear Safety Network (ANSN) entered into operation this year, following a pilot project which was completed in 2003 and which focused on education and training. The major tasks involved in the pilot project included the development of a portal site, of a network structure, of communication protocols, of the taxonomy, of the database structure and entry routines, and of quality control procedures for data input.
2. Hubs have been established in China, Germany, Japan and the Republic of Korea and at the Agency's Headquarters. France is making available education and training material through the Agency's hub. The United States is providing education and training material used at the nuclear safety training events hosted by the Argonne National Laboratory and is assisting in the development of information technology solutions for the ANSN. Indonesia, Malaysia, the Philippines, Thailand and Vietnam, which are also participating in the ANSN, are establishing national centres.
3. A communication forum using the Livelink programme has been created by the Secretariat for information exchange among the experts participating in the development of the ANSN.
4. A Steering Committee chaired by Japan has been established to coordinate the development of the ANSN. It held its first meeting, in China, in March 2004. The work plan agreed upon in the Steering Committee involves the establishment of four topical groups, dealing with education and training, safety analysis, operational safety and safety culture.
5. The results of the ANSN-related activities to date will be reported in December 2004 at the annual coordination meeting of the extrabudgetary programme.

B. Ibero-American Radiation Safety Network

6. In 2003, the Secretariat established, with the financial support of Spain, an extrabudgetary programme on nuclear and radiation safety in Ibero-America that is being implemented in close cooperation with the Forum of Ibero-American Nuclear Regulators. A central element of the programme is the establishment of a radiation safety network to capture and analyse existing and new nuclear and radiation safety knowledge and disseminate it within Ibero-American countries.
7. Since the establishment of the programme, three meetings of experts from Argentina, Brazil, Chile, Cuba, Mexico and Spain have been held in order to define the structure of the network. A demonstration version of the network covering four areas — application of the Code of Conduct on the Safety and Security of Radioactive Sources, the radiological protection of patients, legal and regulatory infrastructures, and education and training — has been developed in Spain and successfully tested. Also, the information technology structure for the network has been developed and the network functionality requirements have been specified.

8. A web-based collaborative forum has been created by the Secretariat, using the Livelink programme, for the sharing of information among the countries involved in the programme during the network development phase.

9. A proposed action plan has been drawn up for future work on developing the network, which should be fully operational by the end of 2005. The results to date and the proposed action plan will be discussed at the next meeting of the Ibero-American Forum of Nuclear Regulators, scheduled for the end of 2004.

C. Looking ahead

10. The results achieved to date in connection with the Asian Nuclear Safety Network and the Ibero-American Radiation Safety Network are encouraging and suggest that such networks should be established also in other regions and that ultimately all the regional networks should be interconnected in a global network for generating and sharing nuclear and radiation safety knowledge worldwide.