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# Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety

*Report by the Director General*

## Summary

Pursuant to resolution GC(53)/RES/10, a report including the following subjects is submitted to the Board of Governors and the General Conference for their consideration:

- Support to Member States embarking on nuclear power programmes
- Regulatory effectiveness
- Capacity building, knowledge networks, education and training
- Civil liability for nuclear damage
- Nuclear and radiological incident and emergency preparedness and response
- Nuclear installation safety
- Radiation safety
- Safety and security of radioactive sources
- Transport safety
- Safety of radioactive waste management
- Safe decommissioning of nuclear facilities and other facilities using radioactive material
- Remediation and rehabilitation of contaminated sites
- Regulatory supervision of legacy sites
- Safety in uranium mining and processing

## Recommended Action

- It is recommended that the Board of Governors and the General Conference consider and take note of this report.

# Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety

*Report by the Director General*

## A. Introduction

1. Although worldwide nuclear safety performance remains at a high level, the need for vigilance, continuous improvement and new thinking is highlighted by the challenges posed by new and expanding nuclear power programmes, the multinational and global nature of today's nuclear activities, and the more sophisticated and wider use of radioactive sources. The Agency is committed, as highlighted during the third meeting of the informal open-ended process on the future of the Agency, to promoting international cooperation to help maintain a high level of nuclear safety and to continuously improve the global nuclear safety regime for this purpose.

2. This report updates the Board of Governors and General Conference on Agency activities undertaken pursuant to General Conference resolutions on measures to strengthen international cooperation in nuclear, radiation, transport and waste safety.

## B. Support to Member States embarking on nuclear power programmes

### B.1. Recent and Ongoing Activities

3. The Steering Committee on Competence of Human Resources for Regulatory Bodies was established to advise the Agency on how it could best assist Member States to ensure Regulatory competence in nuclear safety. The aims of the Steering Committee include: facilitating regulatory networking and developing harmonized approaches and tools for implementing an effective regulatory competence management system; identifying and sharing best practices for training strategies of regulatory bodies; identifying training needs and specific training projects; and promoting cooperation, as well as knowledge sharing and transfer among the participant countries — in particular at a regional level.

4. During the reporting period, an information and communication technology multimedia project continued to capture expert knowledge and experience from countries implementing the Agency's

safety standards. Training courses and workshops on the safety of nuclear installations were filmed and video presentations disseminated for the purpose of learning, as well as sharing knowledge and experience in the implementation of the Agency's safety standards. In addition, the website for training services was upgraded to include the posting of multimedia training material and the creation of new web pages, especially for thematic safety areas. See http://www-ns.iaea.org/training/ni/materials.asp.

## B.2. The Agency's safety standards programme

5. Two meetings of the joint task force comprising the Advisory Group on Nuclear Security (AdSec) and the Commission on Safety Standards (CSS) were organized in October 2009 and in March 2010, in conjunction with the individual AdSec and CSS meetings conducted at the same time. The task force meetings discussed the terms of reference, the feasibility of combining the Safety Standards Series and Nuclear Security Series, and reviewing the measures necessary to implement them in the short term. Preliminary tasks to conduct further feasibility studies were also identified and initiated.

6. The analysis of the feasibility of combining the Nuclear Security Series and the Safety Standards Series will cover the various thematic and operational areas of the domains to determine the areas in which each may be unique or where they may overlap. A report on this is expected to be issued in October 2010.

7. Following adoption of a roadmap in September 2008, the CSS has pursued its implementation with the approval in October 2009 of a reference list of Safety Guides for the long term. Two out of seven parts of the General Safety Requirements (GSR) have been published in all languages (GSR Part 4 and GSR Part 5). GSR Part 1, adopted by the Board in March 2010, is currently in publication, and GSR Part 3 (revision of *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (BSS)) is in the final approval stage after consultations among Member States in early 2010,. The preparation of the other three parts of the General Safety Requirements is expected to be initiated after GSR Part 3 is finalized.

8. The Agency, in collaboration continued its work on the revision of the BSS. Further discussions took place with the co-sponsors and potential co-sponsors and at the meetings of all four Safety Standards Committees (RASSC, WASSC, NUSSC and TRANSSC) in November and December 2009.

9. As part of its outreach programme, the Agency held workshops in Qatar and Brazil in January 2009 and April 2010 to obtain feedback and share experience on the implementation of the current BSS, to discuss amendments made during the drafting of the revised BSS and to identify areas that need further development.

10. One of the key issues highlighted was the need for flexibility in the drafting of the BSS text to allow for differences in national priorities and approaches. States also identified safety culture, both from the viewpoint of the regulator and the operator, and use of dose constraints as important topics that require the development of further guidance. A BSS regional workshop for Africa will take place in Nairobi, Kenya in September 2010.

11. One of the emerging challenges in radiation protection is how best to control exposure to radon in dwellings and in workplaces where workers are not regarded as being occupationally exposed. In December 2009, a technical meeting on newest recommendations on health effects from radon took place in Vienna. The meeting reached consensus on how requirements for controlling exposure to radon should be addressed in the BSS.

12. Draft 3.0 of the BSS was submitted to Member States for comment at the end of January 2010. By the end of May, approximately 1400 comments had been received from 38 Member States and ten international organizations.

13. In March 2010, the CSS also approved a document entitled *Strategies and Processes for the Establishment of IAEA Safety Standards*, which describes strategies, processes and associated responsibilities for the planning, development, establishment, review, revision and approval of the Agency's safety standards. The intent is to document and strengthen the processes that started with the establishment of the CSS and the Safety Standards Committees in 1996, and to achieve the following goals by the end of 2015:

1. An integration of all areas in the Safety Standards Series, using a top-down approach based on *Safety Fundamentals*;
2. A rationalization of the Series with a reasonable and manageable number of Safety Guides;
3. A significant improvement in user-friendliness; and
4. A rigorous and efficient process for the establishment of additional standards and revision of existing ones.

# C. Regulatory effectiveness

## C.1. Integrated Regulatory Review Service

14. The Agency's Integrated Regulatory Review Service (IRRS) is designed to strengthen and enhance the effectiveness of the national regulatory infrastructure of Member States for nuclear, radiation, radioactive waste and transport safety and security of radioactive sources while recognizing that ultimate responsibility to ensure safety in these areas lies with each Member. Through its modular approach, the IRRS allows Member States to select the most appropriate areas for reviews. Expert reviewers — senior regulators from Member States — share information and experiences regarding the various regulatory approaches and policy issues that contribute to the harmonization of regulatory systems worldwide. To aid in the review process, the Agency has developed and distributed a range of tools, including a Self-Assessment Tool (SAT) software, which was released to all Member States in February 2010.

15. Over the reporting period, the Agency conducted IRRS missions to Lebanon, the Russian Federation, the Islamic Republic of Iran and Vietnam, as well as follow-up missions to Germany and the United Kingdom.

## C.2. Lessons learned from IRRS

16. New IRRS guidelines were issued taking into account feedback from Member States and from the many experts worldwide who participated in the review teams. IRRS is now a more flexible, programme, which aims at accommodating particular circumstances of Member States — irrespective of their current regulatory status, complexity or scope.

17. Although the IRRS have proven to be very successful as a regulatory infrastructure peer-review programme, there are circumstances, in particular in the initial stages of developing a State's infrastructure, when advisory missions have been deemed more suitable. Advisory missions use a

smaller group of experts and are specifically tailored to States in the early stages of developing regulatory infrastructure. Advisory missions can also be used for those States wanting a technical advisory review of specific aspects of their infrastructure or programmes. Advisory missions, which began in 2009, have been conducted in Cambodia, Chad, the Democratic Republic of the Congo, Haiti, Lao People's Democratic Republic, Lesotho, Malawi, the Islamic Republic of Mauritania, Senegal and Zimbabwe.

## C.3. Enhancing regulatory effectiveness

18. Taking into consideration Member States' feedback and suggestions, the Agency has been regularly improving the Regulatory Authority Information System (RAIS) to support Member States in their continuous efforts to advance their regulatory control and inventory of radiation sources.. The latest version, RAIS 3.1 Web, was released in 2009 and provides a web interface for RAIS. This can be used, for example, by inspectors in the field, regulatory bodies and regional offices as well as by authorized representatives of facilities to access facility data. To further promote and disseminate the tool, eight RAIS regional and national workshops have been held during the reporting period.

19. The Radiation Safety Information Management System (RASIMS), introduced formally in 2009, provides a collaborative platform that enables the Secretariat and Member State counterparts to work together to identify and meet Member States' radiation safety needs. Regional RASIMS workshops are conducted regularly to facilitate the use of the tool by Member States and to promote the benefits of such cooperation. Additionally, the Agency's self-assessment methodology, questionnaires and SAT software were introduced and made available to Member States in 2010. The regulatory bodies of many Member States have already incorporated SAT as part of their management programmes. RASIMS and SAT will jointly play a key role in the design and preparation of new projects in radiation safety for the next technical cooperation cycle (2012–2013).

20. A new training module is being developed to assist established regulatory bodies in strengthening the effectiveness and sustainability of their regulatory programme. The new training module targets mid-level managers and senior staff of the regulatory bodies, adding to the basic training provided by the Secretariat in the past. This module also focuses on advanced areas, for example, implementing management systems for regulatory bodies, risk informed decisions, knowledge management and strategies for effective and sustainable regulatory control.

# D. Capacity building, knowledge networks, education and training

## D.1. Capacity building

21. In March 2010, a strategic plan document was created for capacity building in Member States and in the Secretariat. It provided for an integrated and systematic approach to develop and continuously enhance the scientific, technological, human, managerial and regulatory competencies and the individual, organizational, institutional, legislative and national/regional capabilities necessary for achieving and sustaining high levels of nuclear safety and security. It emphasized capacity building needed for Member States embarking on the development of a nuclear power programme. Other aspects of the strategic plan outline Member State development of and interactions with national capacity building centers and regional capacity building systems, including the Regulatory Cooperation Forum.

22. A model action plan implementing this strategy is currently being developed and expected to be completed by the first quarter of 2011. The model action plan for Member States brings together all of the Agency's services and activities (safety standards and security guidelines, peer reviews and advisory services, education and training, knowledge networks, and other activities). It is expected that Member States, in partnership with the Secretariat, will adapt the plan to their specific safety and security needs.

## D.2. Knowledge networks

### D.2.1. Global Nuclear Safety and Security Network

23. The roadmap and structure for the Global Nuclear Safety and Security Network (GNSSN) and the International Regulatory Network (RegNet) were presented during the International Conference on Effective Nuclear Regulatory Systems in South Africa in December 2009. Since then, an IT platform has been developed and the data transfer from the supporting country (Germany) was successfully completed by the end of May 2010.

24. By the end of 2010, it is anticipated that the GNSSN and RegNet will be open to Member States. GNSSN and RegNet will strengthen both the human and IT networks for international cooperation and collaboration, and will further enhance the global nuclear safety and security regime.

### D.2.2. Asian Nuclear Safety Network (ANSN)

25. The ANSN held a round-table discussion during the 53rd regular session of the General Conference, with participation from other regional networks such as the Ibero-American Forum of Radiological and Nuclear Regulatory Agencies and the Forum of Nuclear Regulatory Bodies in Africa, to share experiences and lessons learned on capacity building and infrastructure development.

26. At the 3rd Nuclear Safety Strategy Dialogue Meeting, held in Indonesia from 22 to 23 April 2010, senior level safety officers discussed and endorsed a generic action plan on capacity building, and tasked the ANSN Steering Committee with the development and implementation of a regional capacity building system to achieve the ANSN nuclear safety vision by 2020.

27. At the 11th ANSN Steering Committee meeting, held from 26 to 28 May 2010 in Vienna, several important issues were discussed and agreed upon, including: terms of reference for the ANSN, as well as for its Steering Committee, its Capacity Building Coordination Group and all Topical Groups; the timetable for the development of national action plans for the national capacity building centres; an evaluation of ANSN activities; and IT modules to further strengthening the ANSN website.

### D.2.3. International Nuclear Safety Group (INSAG)

28. At the 1st INSAG VIII meeting held from 14 to 16 April 2010, a task force of INSAG members, external experts and Agency staff presented a draft document entitled *A Framework for Integrated Risk-Informed Decision Making Process (IRIDM)* for review and approval by INSAG members. This document provides a framework, principles, and key elements for an integrated, risk-informed, decision-making process. It emphasizes the need for documentation, communication and follow-up on the implementation of decisions, including performance monitoring and corrective action. Although this report is focused on the use of IRIDM in the context of nuclear power plants (NPPs), including spent fuel handling and storage systems, it can also be applied to other nuclear facilities and activities as well as non-nuclear applications. This document is currently in review and will be published later this summer.

### D.2.4. Ibero-American Nuclear and Radiation Safety Network

29. The Agency has continued to support the Ibero-American Forum of Radiological and Nuclear Regulatory Agencies through an extrabudgetary programme. The Forum has finished implementing two projects on continuous improvement of the regulatory framework for the control of medical exposure and licensing life extension of nuclear power plants, and has initiated a project on control of radioactive sources in scrap metal and recycling industries. It has also formulated a project on new functionalities of the Ibero-American Nuclear and Radiation Safety Network in order to meet the increased needs for networking among the various groups of specialists, such as for discussion of common problems, virtual conferencing and exchange of regulatory experiences and lessons learned, particularly with new technologies and techniques in the use of radiation sources.

30. The results of the Forum's project on prospective safety assessment in radiotherapy were also presented at the International Conference on Modern Radiotherapy: Advances and Challenges in Radiation Protection of Patients (2–4 December 2009).

31. The Agency, through a technical cooperation project, disseminated lessons learned from previous accidental exposures, as well as a probabilistic safety assessment tool and a risk matrix assessment tool (both tools applied for the first time to radiotherapy) in a workshop in March 2010 to 18 States. The tools can be used as preventive measures taken by both the hospitals to improve safety, and the regulatory bodies to verify that safety is being improved.

### D.2.5. Forum of Nuclear Regulatory Bodies in Africa (FNRBA)

32. The FNRBA held its 3rd meeting during the 53rd regular session of the General Conference. The objective of this meeting was to review the achievements of the FNRBA since its establishment and to discuss the action plan for 2010. Zambia and Gabon signed the FRNBA charter during the meeting, increasing the membership of the FNRBA to 28 States. Some of the working groups of the FNRBA — especially those on regulatory control of nuclear power plants and uranium mining activities — have been active in the reporting period.

33. The FNRBA participated in the International Conference on Effective Nuclear Regulatory Systems, held in December 2009 in Cape Town, South Africa, to present its strategic plan for 2010–2014. During this conference, strong emphasis was placed on the importance of regional networks as building blocks for continuously improving the implementation of the global nuclear safety and security regime. The FNRBA held meetings with various international organizations to discuss future cooperation and partnerships. FNRBA was also invited to attend a meeting of the Preparatory Committee of the African Union Commission in Addis Ababa, Ethiopia, from 29 March to 1 April 2010.

### D.2.6. Arab Network of Nuclear Regulators

34. The Arab Network of Nuclear Regulators (ANNuR) was created early 2010 with the purpose of enhancing, strengthening and harmonizing nuclear and radiation safety and nuclear security regulatory capacity building and infrastructure development in the Arab countries. It has six thematic groups on strengthening infrastructure and capacity building; legislative and regulatoru frameworks; emergency preparedness and response; radioactive waste and spent fuel management; safety, security and safeguards; and information technology

### D.2.7. Regulatory Cooperation Forum (RCF)

35. At the December 2009 International Conference on Effective Nuclear Regulatory Systems in Cape Town, South Africa, senior nuclear regulators from around the world held intensive discussions

on the regulatory challenges associated with introducing a new nuclear power programme. One of the major conclusions from this conference was for the international nuclear safety community to work more closely together to enhance the coordination and collaboration for capacity building to assist Member States considering nuclear power for the first time as well as those with existing programmes considering expansion. Bringing together nuclear regulators from around the world provides an opportunity to improve safety performance through experience sharing and mutual learning based on the use of the Agency's safety standards and regulatory review services. Therefore, the Secretariat launched an international initiative called the Regulatory Cooperation Forum (RCF) to further promote international coordination and collaboration among mature regulators and regulatory bodies of Member States considering a nuclear power programme for the first time.

36. The RCF Core Group is made up of senior regulators from seven Member States with 'mature' nuclear power programmes as well as from seven Member States considering nuclear power for the first time. On 21 June 2010, the group met and discussed development of interim terms of reference to be approved before the start of the 54th regular session of the General Conference. In addition, the RCF plans to meet on the last day of the 2010 General Conference in association with the Senior Regulators' Meeting. The RCF is open to all Member States.

### D.2.8. Technical and scientific support organizations

37. Technical and scientific support organizations (TSOs), whether part of the regulatory body or a separate organization, are becoming increasingly important as neutral and official organizations, as they can provide the technical and scientific basis for decisions and activities regarding nuclear and radiation safety and security. In this respect, the role, transparency and quality of technical and scientific expertise provided by the TSO in the nuclear industry and provided by regulatory systems are of fundamental importance.

38. The Agency depends on the active participation of TSOs. The Secretariat is committed to encouraging this interaction and cooperation among the TSOs, providing the framework that fosters the development of regional and international networks. Accordingly, from 25 to 29 October 2010, an International Conference on Challenges Faced by Technical and Scientific Support Organizations (TSOs) in Enhancing Nuclear Safety and Security will be held in Tokyo. The conference will focus on international cooperative activities and networking among the TSOs, as well as on developing a global vision for TSOs and recommendations for the future. It is expected to provide a platform for further promoting and strengthening international nuclear and radiation safety, and for the first time, it will also address technical and scientific support for nuclear security.

(See http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=38092, for further information).

## D.3. Education and training

39. An International Conference on Human Resource Development for Introducing and Expanding Nuclear Power Programmes was held from 14 to 18 March 2010 in Abu Dhabi, United Arab Emirates. The conference, attended by 256 participants and 64 observers from 62 countries and 11 international organizations, brought together key nuclear leaders to discuss policy and strategy aspects and their implementation, and to share effective ways to attract and equip the human resources needed to implement a sustainable nuclear power programme. Special emphasis was placed on attracting a younger, early-career workforce in recognition of the fact that it is a necessary precondition for future global nuclear success. The importance of a strong safety culture was emphasized throughout the conference as essential for the continued success of nuclear power programmes. To review further information and outcomes regarding this conference, see Annex 5 of the report entitled *Strengthening*

*the Agency's activities related to nuclear science, technology and applications* (GOV/2010/43-GC(54)/10).

40. In April 2009, the nuclear safety and security working group on coordination of education and training support to member states was chartered to support Member States in providing integrated, consistent and optimized training.

41. General Conference resolutions have specifically emphasized the importance of education and training and the Agency developed a 10-year strategic plan for education and training in radiation protection and waste safety which was approved in 2001. The Steering Committee on Education and Training was established in 2002 to advise the Agency on the implementation of this strategic plan and make recommendations as appropriate. At the end of the 10-year period, an analysis was made of the overall achievements of the strategic plan. The final report, which was endorsed by the Steering Committee, summarized the notable achievements over the period of the strategic plan. It also considered ongoing tasks that could be incorporated into the strategy for the period 2011–2020, which is contained in document 2010/Note 39 entitled *Strategic Approach to Education and Training in Radiation, Transport and Waste Safety 2011–2020: Continuation of the strategic approach 2001–2010*.

42. The Secretariat continues to make progress in relation to developing education and training for the safe transport of radioactive material. A new draft training package on compliance assurance which also includes information on denials of shipment has been developed and will be tested with Member States at the end of 2010. A series of draft modules has also been elaborated that can be used in the development of training courses both within the Agency and elsewhere. These draft modules have been used several times in the past year in different settings and languages (including non-Agency languages).

43. The Agency organized for the first time a train-the-trainers workshop to present the updated *International Nuclear and Radiological Event Scale* (INES) rating methodology to the INES national officers and to encourage governments to join the INES system. As a result of the workshop, an additional four Member States have recently joined the INES system: Kenya, Latvia, Malaysia and the Philippines. Sixty-five countries are now members of the INES system.

44. In 2009, the Agency offered 25 training courses (at the regional and national levels) in various areas of emergency preparedness and response. More than 700 specialists were trained at these courses through lectures, work sessions, drills and exercises. The training covered a wide audience from emergency managers and planners to staff of regulatory authorities and civil protection personnel. On-the-job training was given at the Incident and Emergency Centre (IEC). The specialists also received awareness lectures on specific subjects in emergency preparedness and response.

# E. Civil liability for nuclear damage

45. The 10th meeting of the International Expert Group on Nuclear Liability (INLEX), established by the Director-General, met from 12 to 14 May 2010 at Agency Headquarters in Vienna. Major topics discussed during the meeting included, inter alia, preparations for the Workshop co-organised by the European Commission and the Brussels Nuclear Law Association on the "Prospects for a Civil Nuclear Liability Regime in the Framework of the European Union" including the results of the European Commission (EC) legal study on nuclear liability, the German proposals to allow Contracting Parties to exclude certain small research reactors and nuclear installations being

decommissioned from the scope of application of the 1997 Vienna Convention on Civil Liability for Nuclear Damage (1997 VC) and possibly also the Convention on Supplementary Compensation for Nuclear Damage (CSC), as well as INLEX's outreach activities.

46. In preparation for the Workshop on the "Prospects for a Civil Nuclear Liability Regime in the Framework of the European Union", the INLEX Group was invited to provide its feedback on the results of the EC legal study. While reiterating its concerns as to the options initially tabled by the EC in its study, including the suggestion that the EC might adopt a directive setting up a distinct liability regime, the Group welcomed the latest assurances that the EC would not pursue any option which would work against the possibility of the future creation of a global regime based on the Convention on Supplementary Compensation, and that any proposal from the EC would work on the basis of the current nuclear liability principles, including channelling of liability exclusively to the operator. The IAEA Secretariat took note of the Group's comments and subsequently relayed them further to the EU and to other relevant stakeholders in the context of the IAEA Secretariat's intervention at the aforementioned Workshop.

47. On the proposals by Germany to allow Contracting Parties to exclude certain nuclear installations from the scope of application of the international nuclear liability conventions, the Group took note of a draft position paper - developed by a working group of the IAEA Safety Standards Committees- outlining three exclusion criteria that a Contracting Party would need to apply, namely, radiological criteria for the exclusion of a nuclear installation, a safety assessment methodology for determining compliance with the criteria, and the associated administrative and regulatory processes to be adopted by the requesting Contracting Party. The Group was informed that the draft position paper would be submitted to the relevant IAEA Safety Standards Committees – namely the Radiation Safety Standards Committee and Waste Safety Standards Committee - for consideration at their joint meeting on 28 June - 1 July 2010. The draft position paper was subsequently endorsed by the relevant Safety Standards Committees at their aforementioned meeting and will now constitute the basis for a possible draft decision to be considered at the 11th INLEX meeting.

48. In addition, the Group reviewed INLEX's outreach activities with special reference to the Fourth Workshop on Civil Liability for Nuclear Damage which was held in Abu Dhabi, United Arab Emirates from 9-11 December 2009, and to the Fifth Workshop for countries of the Eastern Europe and Central Asia region to be held from 5-7 July 2010 in Moscow.

49. The Group also provided comments on the draft explanatory document on the 1988 Joint Protocol on the Application of the Vienna Convention and the Paris Convention which will be published by the Agency as part of its Legal Series. This publication will complement the explanatory texts on the 1997 Vienna Convention and the 1997 Convention on Supplementary Compensation which was developed by INLEX and published in 2007.

50. The next meeting of INLEX will take place in May 2011.

# F. Nuclear and radiological incident and emergency preparedness and response

51. The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency establish an international framework to facilitate the exchange of information and the prompt provision of assistance in case of a nuclear or

radiological emergency. By the end of June 2010, there were 104 States and four international organizations party to the Early Notification Convention, and 101 States and four international organizations party to the Assistance Convention.

52. The Early Notification and Assistance Conventions rely on strong and effective ties between the Secretariat and Member States. Therefore, the Secretariat must have in place a strong internal capacity for response to maintain good cooperation and communication with Member States. In-house capacity building to strengthen the internal response within the incident and emergency system continued in 2009 with the IEC providing training for staff in the Department of Nuclear Safety and Security. To increase the pool of expertise in the Secretariat, a process to involve staff from the Department of Nuclear Energy was also initialized. Task performance evaluations were designed and partially implemented for key positions in the incident and emergency system during the latter part of 2009. These evaluations will be continued and enhanced in the coming years.

## F.1. Communication during emergencies

53. An effective, internationally harmonized communication system for nuclear and radiological emergencies is key to effective response and mitigation of the consequences. Development of the International Radiation Information Exchange (IRIX) standards that facilitate the exchange of incident and emergency related information between national, regional and international systems commenced within the framework of the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies.

54. The Secretariat is continuing with the development of a unified system to replace the Agency's current Early Notification and Assistance Conventions Website (ENAC) and the Nuclear Events Web-based System (NEWS). The system is expected to go into operation in 2010 (source: Annual report for 2009).

55. There continues to be a need to establish clear communication procedures for any type of emergency, which could be used by public information officers at both preparedness and response stages to ensure that the public is well informed. The Agency is currently developing a manual on communicating with the public before, during and after a nuclear or radiological emergency.

56. In June 2009, the Agency issued the new *International Nuclear and Radiological Event Scale User's Manual*. The new manual puts forward a newly revised INES, designed to better address areas and activities such as the transport of radioactive material, or human exposure to sources of radiation. The revision also ensures more consistent terminology and adds more examples to the manual. A second print run has already been requested owing to the large number of requests.

## F.2. Assistance and appraisal missions

57. In 2009, the Agency responded to a request from Ecuador for assistance following an overexposure caused by an industrial radiography source. Using the Response Assistance Network (RANET) arrangements, the IEC sent a team of international experts from Brazil and France to study the case and to provide medical advice. In the follow-up period, the IEC facilitated medical management of the injured worker in France where he was successfully treated.

58. In the first part of 2010, the Agency offered assistance to Haiti and Chile with regard to the recovery of radiation sources that might be out of control following the devastating earthquakes. Assistance was also offered to the Dominican Republic.

59. The Agency continues to offer Emergency Preparedness Review (EPREV) missions to assess and evaluate national emergency preparedness and response programmes. During the reporting period, the Agency conducted missions to The former Yugoslav Republic of Macedonia and Malaysia to provide

an independent assessment of their emergency preparedness and response programmes and capabilities, and their conformance with international standards. In addition, eight advisory missions were conducted to assist in developing and strengthening different specific aspects of national emergency preparedness and response systems.

## F.3. Exercises and drills

60. In 2009, the IEC conducted four exercises with its contact points. Three exercises were conducted without prior announcement in order to test the availability of contact points on a 24-hour 7-day-a-week basis as required by the Early Notification and Assistance Conventions and as encouraged by the *Emergency Notification and Assistance Technical Operations Manual* (ENATOM). In August 2009, one exercise was concluded with the specific aim of providing assistance to registered contact points. All exercises were held in compliance with the exercise regime described in ENATOM.

61. Some countries responded too late or not at all to exercise messages. It is in the best interest of all Member States to ensure that their notification process for incoming messages works well; exercises help to ensure efficient and effective processes. The exercise on assistance showed that logistical arrangements are often more of a limiting factor than the national assistance capabilities (technical capabilities) themselves.

62. The IEC played a key role in organizing the ShipEx-1 (2009) international exercise. The exercise objective was to test current capabilities for the safe and expeditious international transport of biological samples for bio-dosimetry. Blood samples were shipped from the Peruvian Institute of Nuclear Energy to participating laboratories in 13 countries within the Latin American Biological Dosimetry Network and RANET. Conclusions drawn from this exercise will enhance the capability of timely and proper shipping of biological samples in international assistance missions.

## F.4. Action plan

63. The International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies was approved by the Board of Governors in May 2004, and endorsed by the General Conference in September 2004. The objective was to improve and strengthen the international emergency preparedness and response system by focusing the efforts of Member States, the Secretariat and competent authorities.

64. The Action Plan identified three main areas for strengthening the international emergency preparedness and response system. These areas are: international communications; international assistance; and sustainable infrastructure. The work on the Action Plan has involved more than 133 experts from 37 countries and five international organizations. These experts have addressed all 17 actions identified in the Action Plan. Progress reports under the Action Plan have been endorsed at Competent Authority meetings in 2005, 2007 and 2009. The final report on activities, outputs and recommendations has been prepared and will be submitted to the Board of Governors in March 2011 for its consideration and approval.

65. A concerted effort is required by all Member States and international organizations to ensure full implementation of the recommendations arising from the Action Plan.

# G. Nuclear installation safety

66. In September 2009, the Agency held an international meeting on management system considerations for developing nuclear power programmes with the participation of 42 Member States. The objective of this meeting was to discuss the application of the new IAEA Safety Standards on Management Systems with a special focus on leadership, safety culture and the implementation of management systems in relation to establishment and sustainable development of a national nuclear infrastructure. The Nuclear Energy Series documents and its management system supporting document were also presented and discussed. The meeting identified areas where the IAEA could provide additional support to Member States introducing or expanding their nuclear power programmes through the implementation of the new set of Safety Standards and Nuclear Energy Series documents.

67. In October 2009, the Agency published *The Management System for Nuclear Installations* (Safety Guide No. GS-G-3.5). Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus that it is necessary to take the measures recommended (or equivalent alternative measures). The Safety Guides present international good practices, and increasingly they reflect best practices, to help users striving to achieve high levels of safety. This Safety Guide is issued in support of the Safety Requirements publication on The Management System for Facilities and Activities[1]. It provides recommendations in relation to nuclear installations that are supplementary to the general recommendations provided in the Application of the Management System for Facilities and Activities. [2].

68. The Agency developed, organized and provided lectures for an international training course on leadership and management of nuclear power infrastructure in emerging nuclear power States, held from 26 October to 6 November 2009 at Argonne National Laboratory, USA. The event was attended by 28 decision-makers from 20 Member States.

## G.1. Safety review service missions

69. The Operational Safety Review Team (OSART) service focuses on operational safety aspects, provides for the application of the relevant safety standards and makes the review results publicly available for interested stakeholders. Eight OSART missions have been requested for 2011, which is an increase compared to the five missions conducted in 2009.

70. Member States are inviting OSART missions with a frequency reflecting their needs for independent review. However, some Member States have never requested an OSART mission and others have not invited an OSART mission for over ten years. Given the fact that the Agency's safety standards and the international best practices in nuclear power programme operations have developed significantly since the mid-1990s, repeat follow-up OSART missions are now recommended.

## G.2. Sharing operational experience

71. As part of the Agency's operational safety review services, all operational experience feedback programmes in Member States are reviewed during IRRS missions for regulators and during OSART missions (as well as during peer review missions organized by the World Association of Nuclear Operators (WANO) and the Institute of Nuclear Power Operators (INPO)) for nuclear power plants.

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[1] The Management System for Facilities and Activities, Safety Requirements No. GS-R-3 (2006)

[2] Application of the Management System for Facilities and Activities, Safety Guide No. GS-G-3.1 (2006)

The findings from these reviews determine the types of improvement opportunities that exist in the area of operating experience, and recommendations are provided to support future improvements. A specific review service for operating experience, Peer Review of Operational Safety Performance Experience (PROSPER) service, which began in 2008, offers techniques to prevent operational failures at nuclear power plants and utilities through the identification, analysis and correction of programme weakness through systemic root cause analysis. Nuclear power plant operators first conduct a programme review self-assessment of the effectiveness of their operational performance. Then, an international PROSPER team reviews this self-assessment and offers comments and recommendations to strengthen the findings and conclusions of the self assessment report. To date, however, no Member State has requested this service. As a result, therefore, it is intended to broaden the scope of the PROSPER service to include regulators and it is hoped that Member States will take advantage of the improvement opportunities offered by this service.

72. Events continue to be reported to the International Reporting System for Operating Experience (IRS) — so far during this reporting period, approximately 80 events have been reported and the overall trend shows that numbers are increasing. The need to openly share information on safety-related events has been discussed in several forums, including at Senior Regulators' Meetings and during routine annual meetings of the national operating experience coordinators. However, under-reporting of events continues, including the failure to share information on some significant events. The consequence of this is that nuclear safety-related lessons learned are not being shared, and avoidable safety-related events are continuing to occur.

## G.3. Plant life management and ageing issues

73. The Secretariat's efforts in the area of nuclear power plant life and ageing management are partially reviewed during OSART missions. However, Safety Aspects of Long Term Operation of Water Moderated Reactors Peer Review Service (SALTO) missions more specifically focus on management of ageing and all issues related to long term operation of nuclear power plants.

74. With many Member States declaring their intention to extend operating nuclear power plants beyond their originally anticipated lifespan, the assessment of safe long term operation now becomes one of the key issues for regulators and utilities. Underscoring the importance of safety aspects of long term operation is the fact that approximately one third of the total number of safety-related events reported in the IRS are related to ageing in the form of material degradation.

75. It is clear from safety review findings and recommendations that there are ample opportunities for improvement of nuclear plant life management. Furthermore, review results have also pointed out the lack of supportive guidance from an internationally recognized reference on the decision-making processes needed for the continued operation of a nuclear power plant. In May 2009, a technical meeting was organized on generic ageing lessons learned to collect knowledge and experience in this area. 30 Member States with more than ten years of experience in operating nuclear power plants attended. In response to the results and the recommendations from the technical meeting, the Agency has prepared a draft international generic ageing lessons learned guidance framework to be further developed through an extrabudgetary programme proposed for the period 2010–2012.

## G.4. Safety culture

76. The Safety Culture Assessment Review Team (SCART) service differs from other services in that it focuses on human behaviour. SCART does not intend to assess the design or technical operation of a nuclear power plant, but looks at a nuclear utility as a whole, which means that all major functional areas and all responsibility levels from the shop floor to the boardroom are included in the review.

77. At the request of the Government of Mexico, the Agency conducted a SCART mission from 14 November to 2 December 2009 in Laguna Verde NPP. The Agency conducted a SCART follow-up mission in Santa Maria de Garoña, Spain, in October 2009. After three SCART missions, the Agency is currently preparing a consultancy meeting for reviewing the *SCART Guidelines* as part of its best practices feedback loop.

78. The Agency initiated three projects in 2010 dedicated to management systems and safety culture, and focusing on oversight and assessment. They are being implemented in Bulgaria, Romania and Latin America (Argentina, Brazil and Mexico).

## G.5. Safety of research reactors

79. There is increasing recognition that the synergy between safety and security of research reactors should be promoted and that measures must be designed and implemented in an integrated manner to ensure that security measures do not compromise safety and vice versa during all operational stages. In June 2010, the Agency organized a workshop to discuss the synergy between safety and security of research reactors.

80. The Secretariat is continuing its efforts to complete the set of Safety Guides that cover research reactors. Safety Guide No. NS-G-4.7, entitled *Ageing Management for Research Reactors* is scheduled to be published later in 2010. Two other draft Safety Guides, *Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors* (DS 351) and *Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report* (DS 396), are in the safety committee approval process.

81. As part of the Secretariat's effort to further enhance safety management of research reactors, a technical meeting on research reactor ageing management, modernization and refurbishment was organized in cooperation between the Departments of Nuclear Safety and Security and of Nuclear Energy. The meeting, held in October 2009 in Vienna, was an important forum to address research reactor ageing issues and to exchange operational experiences and lessons learned among participating countries.

82. Further to the recommendations from an international meeting held in 2008 on the application of the Code of Conduct on the Safety of Research Reactors, the Secretariat continued its efforts to further enhance the application of the Code and organized two regional meetings in May and July 2010 in Egypt and China respectively, and one national meeting for Pakistan in May 2010. These activities contributed to improving networking between regulatory bodies and operating organizations, to developing technical and safety infrastructures needed for new research reactor projects, and to addressing common safety issues identified from Member State self-assessments.

83. The Agency continued to operate the Incident Reporting System for Research Reactors (IRSRR) to enhance the safety of these facilities through collection and analysis of information on events and disseminating the lessons learned from them. In October 2009, the new web-based IRSRR, which uses a common platform with the IRS and the Fuel Incident Notification and Analysis System (FINAS), was released (for more information, see: http://www-ns.iaea.org/tech-areas/research-reactor-safety/irsrr-home.htm). The renewed system was presented during the sixth meeting of the IRSRR national coordinators, which was held in November 2009 in Petten, Netherlands. The meeting was attended by 54 participants representing 34 of the 51 Member States participating in the system.

## G.6. Safety of fuel cycle facilities

84. Following the publication in 2008 of Safety Requirements No. NS-R-5, entitled *Safety of Nuclear Fuel Cycle Facilities*, three Specific Safety Guides were published in 2010: *Safety of Conversion*

*Facilities and Uranium Enrichment Facilities* (SSG-5)*, Safety of Uranium Fuel Fabrication Facilities* (SSG-6), and *Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities* (SSG-7). Work is continuing to complete the set of Specific Safety Guides that will cover the remaining areas of the nuclear fuel cycle, including reprocessing facilities, storage of spent fuel, fuel cycle research and development facilities and criticality safety.

85. These publications address the front end of the nuclear fuel cycle, and provide the basis for the Agency's Safety Evaluation of Fuel Cycle Facilities During Operation (SEDO) review service. Work is continuing to finalize the guidelines for SEDO missions. A follow-up SEDO mission will be implemented in 2010 at a fuel fabrication facility in Brazil, which received a pilot SEDO mission in May 2007.

86. Since the Fuel Incident Notification & Analysis System (FINAS) became operational as a web-based system in 2008, participation and event reporting has continued to improve. The 17 Member States currently participating in FINAS cover approximately 80% of the fuel cycle facilities operating worldwide. The joint IAEA/NEA biennial meeting of the FINAS national coordinators will be held in Vienna in October 2010. The participants will exchange information on safety related incidents at fuel cycle facilities and discuss the operational status of FINAS.

## G.7. Nuclear power plant design analysis

87. Two documents have been produced describing the methodology of the Generic Reactor Safety Review (GRSR) service for use by Member States under the guidance of the Agency. A further guidance document has also been produced explaining how each requirement within General Safety Requirements Part 4 can be satisfied and what needs to be reported in the safety case. A request has been received from the Republic of Korea for the Agency to carry out an assessment of its 1000MW reactor design.

## G.8. Natural events and seismic safety

88. The International Seismic Safety Centre (ISSC) was created in July 2009, taking over the responsibilities of the Engineering Safety Section in the areas of site safety and protection against external hazards. Positive achievements are illustrated by the outcome of successful ISSC extrabudgetary projects and the preparation of new extrabudgetary projects, the development of a web-based external events notification system, and the development and update of six safety standards related to seismic, volcanic, meteorological and hydrological hazards, site survey, dispersion and environmental impact assessment. Responding to requests, the ISSC provides assistance (capacity building and site safety review missions) for site selection and site evaluation for nuclear power plants. Also, the ISSC is actively involved in international events, such as the International Conference on Structural Mechanics in Reactor Technology (SMiRT) and international and regional workshops.

# H. Radiation safety

## H.1. Occupational radiation safety

89. The Occupational Radiation Protection Appraisal Service (ORPAS) self assessment tool has been developed and is being tested. At the request of the Government of Uruguay requested an ORPAS mission; a pre-mission took place in Uruguay in November 2009 followed by a the full-scope mission

took place in June 2010, covering several medical and industrial facilities, as well as technical services.

90. The Steering Committee of the Action Plan for Occupational Radiation Protection held its 4th meeting from 15 to 17 February 2010, to evaluate the results achieved since the last meeting. Of the 14 original actions, only 4 are still open and are related to the education and awareness of workers in the field, updating radiation protection manuals for medical staff and creating a document on developing a coherent approach to radiation and other risk factors in the work place. The meeting provided the participants with an opportunity to discuss new issues of interest within the occupational, radiological protection area, and to provide the Agency with recommendations on future activities. As part of the Action Plan for Occupational Radiation Protection steering committee recommendations, a web page on occupational radiation protection (ORPNET) will become operational in July 2010. This new web page will link all regional As Low As Reasonably Achievable (ALARA) networks as well as other important systems in radiation protection such as ISOE, ISEMIR and the Radiation Protection of Patients (RPoP) website.

91. Under the Information System on Occupational Exposure in the Medical, Industrial and Research Areas (ISEMIR) project, the first steps were taken towards establishing a method for obtaining occupational exposure data in specific areas of radiation use in medicine, industry and research where non-trivial occupational exposures occur. This initiative will complement data collection for the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). A worldwide survey performed in mid-2009 by the Working Group on Interventional Cardiology demonstrated, inter alia, that occupation-specific and role-specific data were in general not available from radiation protection regulatory bodies, and that means for obtaining such data directly from, in this case, interventional cardiology facilities would need to be developed. The Working Group on Industrial Radiography began preparing a worldwide survey, which will be launched by the end of 2010.

92. In October 2009, the Agency hosted the 2009 Information System on Occupational Exposure (ISOE) International ALARA Symposium in Vienna, with 110 participants attending from 27 countries, to discuss optimized ways to reduce the collective dose in nuclear power plants. The ISOE provides a forum for radiation protection professionals from both nuclear power plant utilities and regulatory authorities to share worldwide dose reduction information and operational experience, as well as coordinate international cooperative projects to improve the optimization of worker radiological protection at nuclear power plants. ISOE is promoted and co-sponsored by the OECD/NEA and the IAEA.

93. The Asia Region ALARA Network (ARAN) held a workshop in China (12–16 October 2009) on improving radiation protection in naturally occurring radioactive material (NORM) industries. Involvement by all countries from the region, and the need for education and training in the occupational areas were stressed by all participants. The Regional European and Central Asian ALARA Network (RECAN) completed five annual workshops on varied topics. The 5th workshop held in Almaty, Kazakhstan, from 22 to 24 September 2009, focused on guidance for technical and scientific support organizations (TSOs) and the role of TSOs in optimization. The 6th workshop is planned for Larnaca, Cyprus, 15-17 September 2010 on education and training as an essential tool for implementation of occupational radiation protection. Regional ALARA networks are still to be established in the African and Latin American regions.

94. A quality management system has been fully implemented in the Radiation Monitoring and Protection Services. The results of the February 2010 internal audit confirmed the quality of monitoring (individual and workplace) services provided by the Agency to its occupationally-exposed workers and contracted experts. A re-accreditation of the monitoring services is being planned for 2011.

## H.2. Medical radiation safety

95. In September 2009, the Agency, jointly with the European Commission (EC), hosted the International Workshop on Justification of Medical Exposure in Diagnostic Imaging in Brussels, Belgium. The workshop concluded that there is a significant and systemic practice of inappropriate examination in radiology, and that among the tools available for improving the situation is 'AAA' — Awareness, Appropriateness and Audit — which is characterized by communication of risk and the use of referral guidelines and clinical audit. During its fourth meeting in March 2010, the Steering Panel of the International Action Plan for the Radiological Protection of Patients commended the progress made on radiation protection of patients and recommended the development of an international campaign around the use of 'AAA', initially focusing on awareness among patients, the public, professionals, policy makers and the media.

96. Guidance on patient dose management through optimization is also provided by the Agency. An increasingly important mechanism for this purpose is the Agency's public website dedicated to advice on radiation protection of patients (http://rpop.iaea.org), which had in excess of 750 000 monthly hits in early 2010. Recent additions to the website include specific information for patients and extensive training material for health professionals in Spanish.

97. The annual number of fluoroscopically guided interventional procedures has grown significantly in the past decade. The Agency published a Safety Report in June 2009, entitled *Establishing Guidance Levels In X Ray Guided Medical Interventional Procedures*, as a tool for optimization of protection in the exposure of patients. The Agency has also developed the Safety in Radiological Procedures (SAFRAD) reporting system, which has undergone testing and is ready for pilot release. Furthermore, the Agency is developing a methodology for the long-term individual recording of cumulative patient doses in diagnostic and interventional procedures.

98. A recently published Safety Report entitled *Release of Patients after Radionuclide Therapy* attempts to incorporate advice from the International Commission on Radiological Protection (ICRP) regarding the provision of a more consistent approach in this area and to give some practical guidance to medical professionals involved in the release of patients after therapy with unsealed radionuclides. A position statement, consistent with this Safety Report, was developed and sent to National Liaison Officers of Member States.

99. The International Conference on Modern Radiotherapy, organized by the French Nuclear Safety Authority (ASN) in December 2009 in Versailles, France, in cooperation with the Agency and other international and national organizations, emphasized that new technologies in radiotherapy should be independently evaluated prior to use. Proactive safety assessment is an element being incorporated into the reporting system for safety in radiation oncology (SAFRON), which is being developed by the Agency.

## H.3. Radiation protection of the environment

100. In continuation of the Agency's activities to advise the Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention), the Agency presented a proposal for a radiological assessment procedure based upon current scientific knowledge, which aims to integrate the protection of humans and the environment in a consistent manner. This approach is being considered for application within regulatory frameworks on derivation of values for exemption and clearance of material with low amounts of radioactivity.

# I. Safety and security of radioactive sources

## I.1. Code of Conduct on the Safety and Security of Radioactive Sources and its supplementary Guidance on the Import and Export of Radioactive Sources

101. As of 30 June 2010, 99 States have made a political commitment to implement the Code of Conduct on the Safety and Security of Radioactive Sources, of which 58 have also notified the Director General of their intention to act in a harmonized manner in accordance with the Code's supplementary Guidance on the Import and Export of Radioactive Sources. A total of 105 States have nominated points of contact for the purpose of facilitating the export and import of radioactive sources and have provided the details to the Agency. The Code and the Guidance are not only widely accepted on a national level, but are also supported by several groups of countries such as the Asia-Pacific Economic Cooperation, the European Union, the Group of Eight (G8) and the Organization for Security and Co-operation in Europe. This very strong political support shows that the provisions in the Code and the Guidance are widely accepted at the international level.

102. In accordance with the formalized process for a periodic exchange of information and lessons learned, and for the evaluation of progress made by States towards implementing the provisions of the Code of Conduct, the Agency held an open-ended technical meeting of technical and legal experts in Vienna from 17 to 21 May 2010. The meeting was held was attended by 160 experts from 91 States and several organizations.. The objective of this meeting was to promote a wider exchange of information on national implementation of the Code and Guidance, and to review the progress made since the last meeting in 2007. Moreover, specific issues arose during 2008 and 2009 that required further discussion, and the Guidance was reviewed.

103. The meeting was held in Vienna from 17 to 21 May 2010 and was attended by 160 experts from 91 States and several organizations. The meeting achieved the objective of facilitating the exchange of information between Member States and concluded that there is widespread international support for the Code and the Guidance. States that have not yet made a political commitment to the Code and/or the Guidance were encouraged to do so. The adoption and implementation of the Code by Member States, and the Agency's technical cooperation programme and bilateral assistance programmes have produced significant improvements in regulatory infrastructure and capabilities in relation to radioactive sources in many Member States. The meeting recommended to the Secretariat to implement a review process for the Guidance; organize a consultancy meeting discussing issues of managing orphan sources detected at national borders; convene an international follow-up conference based on the findings of the International Conference on the Safety and Security of Radioactive Sources, held in Bordeaux, France, in 2005; and maintain a high level of awareness of the safety and security of radioactive sources at policy and decision-making levels in all Member States.

## I.2. National strategies for regaining control over orphan sources

104. A training package on orphan sources has been developed to complement the draft Safety Guide entitled *Methodology for a National Strategy for Regaining Control over Orphan Sources* that is currently being finalized and to assist Member States in its implementation. Topics to be addressed by the training materials include the verification of radioactive source registers, the development of orphan source search plans, and the use of radiation detection equipment for finding orphan sources. The training material will be used to conduct workshops and field missions.

105. The Orphan Source Search and Secure project is aimed at assisting countries in establishing their capabilities to search for and secure orphan radioactive sources and establish verified source

inventories. During the reporting period, assistance, including expert advice on procurement of search equipment and services, was provided to Burkina Faso, Cameroon, Kenya and Zambia.

## I.3. Detection and management of sources in scrap metal

106. One of several recent incidents involving the presence of radioactive materials in scrap metal resulted in one death and several acute radiation casualties in May 2010 in India and indicated the urgent need for international initiatives. Reducing the probability and magnitude of the problem will require the cooperative efforts of the metal recycling and production industries, governmental bodies including national regulators, and radioactive waste management organizations. In response to the recommendations from the International Conference on Control and Management of Inadvertent Radioactive Material in Scrap Metal, organized by the Agency and the Spanish Nuclear Safety Council in Tarragona, Spain in February 2009, and upon a request from the General Conference, the Agency, in collaboration with other international organizations, began drafting a proposal for an international agreement concerning the transboundary movement of scrap metal containing radioactive material. Furthermore, a Safety Guide on orphan sources and other radioactive materials in the metal recycling and production industry is nearing completion. It will provide national recommendations on the protection of workers, the public and the environment from hazards associated with radioactive material inadvertently present in scrap metal.

# J. Transport safety

## J.1. Update on activities

107. The Agency continues to respond to requests from Member States to be involved in informal discussions held between coastal and shipping states, including a meeting held at the September 2009 General Conference. These meetings emphasize the importance of maintaining dialogue and consultation aimed at improving mutual understanding, confidence building and enhanced communication in relation to the safe maritime transport of radioactive material.

108. Two meetings have been held to develop a draft proposal for discussion on how appropriate information can be made available to authorities responding to an emergency. The International Maritime Organization's (IMO's) Maritime Safety Committee agreed that the IMO Secretariat should be involved in the development of this proposal. The completed draft proposal is expected for discussion at the Transport Safety Standards Committee (TRANSSC) meeting to be held in Vienna, in November 2010.

109. The Agency continues to take into account scientific evidence of relevant global weather patterns, infrastructure and industry changes and their effects on transport in the ongoing review of the Agency transport safety standards, including the development of the draft fissile-excepted material requirements for the transport of radioactive material. This draft was discussed and accepted by the Safety Standard Committees in June 2010 and will be sent for review by Member States.

## J.2. Update on denials of shipment activities

110. The action plan of the International Steering Committee on Denials of Shipment of Radioactive Material has progressed over the past year to respond to denials of shipment, and the following specific deliverables have been completed: updates to the Global Integrated Shipping Information System (GISIS) database (covering problems encountered in shipment of radioactive material), a draft

communication toolkit (containing, for example, checklists for communication plans), and outline material to be used in training (e.g. targeted training modules). These tools have been presented at a workshop of national focal points, held in conjunction with the 5th Steering Committee meeting in February 2010. Furthermore, it was announced that the Secretariat intends to minimize and hopefully eliminate the issue of denials of shipment by the 2013 General Conference.

# K. Safety of radioactive waste management

## K.1. Predisposal of radioactive waste

111. The publication of a revised and updated Safety Requirements entitled *Predisposal Management of Radioactive Waste* has led to proposals to develop a number of other Safety Guides. These will meet the requirements for different facilities and activities in a manner that provides a graded approach to workforce and public safety, and will take into consideration their interdependencies while providing for optimization of waste management programmes for different treatment and disposal options, and potential clearance and recycling regimes. As part of a supporting project, the Safety Assessment Framework (SAFRAN) tool developed in 2008 assists the process of developing a safety case and performing a supporting safety assessment. The tool is available online.

112. A number of peer review missions have recently commenced in the area of predisposal radioactive waste management. In particular, reviews have been carried out of the radioactive waste management programmes at all fifteen operating reactors in Ukraine. A review has also been launched by the Dutch national radioactive waste management programme. These reviews have been undertaken based on the new safety requirements standard, *Predisposal of Radioactive Waste, Safety Requirments, GSR-Part 5* for predisposal management of radioactive waste and provided evidence of the utility of the standard for such purposes.

## K.2. Management of spent fuel

113. The International Conference on Management of Spent Fuel from Nuclear Power Reactors, held in Vienna from 31 May to 4 June 2010 addressed a broad range of aspects including national policy, safety and licensing, transport, medium and long term storage, reprocessing and disposal. It also reviewed specific technical issues associated with higher burnup fuel, mixed oxide (MOX) fuel and dealt with damaged and degraded spent fuel. The Conference further emphasized the need for comprehensive national strategies on the management of spent fuel, and it was noted that despite some setbacks, noticeable progress is being made with geological disposal. It is clear that spent fuel and waste management experts have become acutely aware that overall confidence must be enhanced in a much wider audience if a decision to implement geological disposal is to be acceptable. The Agency will carefully evaluate the deliberations at the conference and adjust its programme to respond to the evolving circumstances. For further information, see Annex 4 of the report entitled: *Strengthening the Agency's activities related to nuclear science, technology and applications* (GOV/2010/43-GC(54)/10).

## K.3. Disposal of Radioactive Waste

114. A major step has been the recent finalization of the Safety Requirements entitled *Disposal of Radioactive Waste* (Specific Safety Requirements No. SSR-1). This was submitted to the Board of Governors in June 2010 and integrates the standards on near surface and geological disposal to cover

all disposal types, including boreholes, mine tailings and very low and intermediate level waste disposal facilities. One major factor addressed in the standard is the status of near-surface disposal facilities following their closure. Finalization of the standard has enabled progress to be made on developing up-to-date guidance to meet the requirements for the different types of disposal facilities.

115. Work on the development of guidance on the safety case and supporting assessments for demonstrating the safety of disposal facilities has also made good progress. The safety case concept has gained increasing prominence internationally in demonstrating the safety and licensing of disposal facilities. International consensus in this area will assist in the licensing of geological disposal facilities, which has now commenced in a few countries.

## K.4. Implementation of borehole disposal

116. Appropriate disposal of disused sources is costly, and for high activity sources also technically difficult. Many countries with minimal financial, human and technical resources have difficulty in assuring their adequate long-term management. Therefore, the Agency has developed technical solutions for conditioning, storage and disposal of sealed radioactive sources, including borehole disposal of disused sealed sources (BOSS). BOSS conditions sources using a mobile hot cell that allows the placement of high activity sources into a disposal package and then the emplacement of this package into a borehole. A practical use of BOSS elements has been demonstrated in several Member States and the Agency has been offering this safe, simple and economically viable option to any interested country. The Agency provides this assistance through retrieving and conditioning sources, training local staff, and offering technical expertise and generic documentation; this allows for easy adaptation to specific national conditions. Benefits to Member States include better control of existing sources, conditioning of sources and their secure storage, and implementation of a safe, secure and affordable disposal system.

## K.5. Networks for radioactive waste management

117. The International Low-Level Waste Disposal Network (DISPONET), established in 2009, organized three regional events in 2010. The Bhabha Atomic Research Centre (BARC), Mumbai, India, hosted a workshop to exchange technical information on disposal projects in the Middle East and Asia. The Spanish National Company for Radioactive Waste (ENRESA) organized a similar event in Córdoba, Spain, for Latin American countries. In addition, the German Company for the Construction and Operation of Waste Repositories (DBE) in Peine, Germany, organized an international workshop on application of waste acceptance criteria in the disposal of low and intermediate level waste.

118. Furthermore, three inter-comparison and harmonization projects focus on demonstrating the safety and licensing of predisposal radioactive waste management facilities and activities, the near surface disposal of radioactive waste and the geological disposal of high level waste. These projects are, respectively, the International Project on Safety Assessment Driving Radioactive Waste Management Solutions (SADRWMS) (http://www-ns.iaea.org/tech-areas/waste-safety/sadrwms/), Practical Illustration and Use of the Safety Case Concept in the Management of Near-Surface Disposal (PRISM) (http://www-ns.iaea.org/projects/prism/), and the International Project on Demonstrating the Safety of Geological Disposal (GEOSAF). They have broad representation from Member States, providing an opportunity to compare national approaches to safety demonstration and licensing with the safety standards — both existing and those under development. This process provides valuable input to the standards development process while at the same time obtaining feedback on the efficacy of existing standards. These projects also provide an excellent forum for knowledge transfer, especially for people and organizations of limited experience.

## K.6. Development of a web-based platform for network communication

119. Radioactive waste management networks have led to measurable improvements in the delivery of Agency programmes in waste management and decommissioning. Identification and nomination of appropriate candidates for training activities, provision of experts, additional offers to host training activities, and the transfer of relevant information at organizational and individuals level have all accelerated. As the logical next step in their development, the networks require a mechanism to facilitate direct communication among network participants, and to make Agency training materials available on demand in a user-friendly form. Working in partnership with like-minded national and international organizations, a web-based platform is currently under development to facilitate the delivery of training and the exchange of information among participants in the Agency's waste and decommissioning networks.

# L. Safe decommissioning of nuclear facilities and other facilities using radioactive material

## L.1. Decommissioning planning

120. The Agency assists Member States in establishing regulatory and technical frameworks for decommissioning facilities using radioactive materials, and for the timely planning of decommissioning and increasing staff competencies involved in preparation and implementation of the decommissioning. In 2010, about 20 missions and training events were organized for the European, Asian and Latin American regions to assess current plans and practices, to advise on their improvement, to transfer knowledge and experience from more advanced countries and to support the establishment of communication channels and direct knowledge transfer among countries facing similar decommissioning challenges. Several first-time training events were offered to Member States in 2010 — for example, on determination of neutron-induced activity for decommissioning purposes.

121. A follow-up decommissioning peer review mission was conducted in October 2009 to assess the progress done by Magnox South since the first peer review mission for the United Kingdom at the Bradwell Magnox NPP, and was completed in 2008. This follow-up mission focused on the issues identified and improvement recommended during the 2008 mission.

## L.2. International Project on Use of Safety Assessment in Planning and Implementation of Decommissioning of Facilities using Radioactive Material

122. The International Project on Use of Safety Assessment in Planning and Implementation of Decommissioning of Facilities using Radioactive Material (FaSa) provides practical recommendations on the evolution of decommissioning safety assessment during the facility lifetime and on using safety assessment results in planning and conducting decommissioning. About ten Working Group meetings were held in 2010.

## L.3. Iraq decommissioning project

123. In 2010, the Iraq decommissioning project made significant progress in decommissioning several former nuclear facilities in Iraq, including the Al Tuwaitha site. The decommissioning of the materials at a testing hot laboratory (named LAMA), in Iraq, where 500 tonnes of radioactively contaminated

and uncontaminated scrap metal and rubble had been dumped from various locations, was completed. Decommissioning of the former GeoPilot plant, used to produce kilogram quantities of hydrated yellowcake, is also nearly complete. Preparatory work has begun on a third facility to be decommissioned, the radioisotope production building, including data collection and regulatory review of the project management plan. The decommissioning of these lightly contaminated facilities has allowed the Iraqis to build technical capacity and managerial experience and skills to manage and execute the decommissioning and restoration of significantly contaminated facilities on their own. Regarding radioactive waste management, Iraq developed a draft national radioactive waste management policy and strategy.

124. The Government of Iraq intends to establish a radio-analytical laboratory to analyse samples from sites undergoing decommissioning. A partnership between Iraq and the International Radioecology Laboratory in the Ukraine is being set up to meet this need. Also, meetings were organized in the USA to assist Iraqi scientists in gaining facility knowledge, in understanding equipment and processes used to characterize, condition, store and dispose of radioactive waste, and to advise on the potential use of ion beam technology in Iraq's scientific endeavours.

# M. Remediation and rehabilitation of contaminated sites

## M.1. Central Asia initiative

125. The Agency and the international community have a strong interest in the environmental and socially responsible development of the uranium production industry, as well as the orderly remediation of uranium production legacy sites according to international standards, recommendations and practices. In 2004, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan approached the Agency, requesting technical assistance and expert advice to deal with former uranium industry legacy sites. In response to this request, the Agency has initiated several projects in Central Asia.

126. Concurrently with the Agency, a number of other institutions were also active in the region. Projects addressing the legacy sites were run by the European Commission (EC), the International Bank for Reconstruction and Development, United Nations Development Programme, United Nations Environment Programme, OSCE and the North Atlantic Treaty Organization (NATO). Their projects addressed various aspects of uranium legacy wastes and related to the objective of reducing the health and environmental hazards presented by the sites. To increase the effectiveness of the results achieved by these complementary projects, the Agency engaged these international organizations in a series of coordination meetings. In follow-up discussions, the Agency offered to develop a baseline document on uranium legacy sites in Central Asia to provide a reference for future planning by national and international organizations interested in the remediation of uranium legacy sites in the region. A document entitled *Assessment and Proposals for Uranium Production Legacy Sites in Central Asia* was prepared with the cooperation and support of the EC- and input from experts in the region, and was published in March 2010.

127. In line with the recommendations from the International Conference on Remediation of Land Contaminated by Radioactive Material Residues, held in Astana, Kazakhstan, 18-22 May 2009, and the recommendations in the baseline document, the Agency has supported the development of environmental impact assessments for priority sites in Central Asia.

# N. Regulatory supervision of legacy sites

128. One of the outcomes of the International Conference on Remediation of Land Contaminated by Radioactive Material Residues was a call to enhance regulatory supervision of the remediation of legacy sites, and to share experiences in addressing multifaceted aspects of radiation and nuclear safety at legacy sites. Bolstered by GC(53)/RES/10. 8 op 65, supporting the development of a forum to facilitate the sharing of experiences, the Agency initiated the formation of an International Forum on Regulatory Supervision of Legacy Sites, for which the Agency serves as the Scientific Secretariat, enabling regulatory authorities to network on specific aspects of the remediation of legacy sites. The overall objective of the Forum is to promote high standards of regulatory supervision for legacy site management, in line with the Agency's safety standards and good international practices. This will be achieved through the collection and collation of legacy site information; the exchange of legacy site information; and a discussion on how regulatory supervision can be more effective and efficient through the use of technical meetings convened by the Agency.

129. In December 2009, the Forum's first organizational meeting was held in Oslo, Norway, at the offices of the Norwegian Radiation Protection Authority. The mission and objectives of the Forum were discussed. Overall, the idea was well received and the planning group will be expanded at the first technical meeting in October 2010.

# O. Safety in uranium mining and processing

## O.1. Uranium Production Site Appraisal Team

130. Brazilian Nuclear Industries (INB) requested a mission under the Uranium Production Site Appraisal Team (UPSAT) programme to conduct a peer review at the INB Caetité Uranium Mine. This was the first service of its kind since the UPSAT programme began. The UPSAT mission took place in February 2010, and the final report was assembled and submitted to INB in March 2010.