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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(52)/RES/9, 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
- Knowledge networks
- Civil liability for nuclear damage
- The Agency's safety standards programme
- Capacity building including education and training in nuclear, radiation, transport and waste safety
- 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
- 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. The Agency has continued its focus on the continuous improvement of the global nuclear safety regime that is in place today as the international framework for nuclear safety. 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. In addition to discussing the thematic safety areas, the report includes a number of cross-cutting areas, including support for Member States embarking on nuclear power programmes, regulatory effectiveness, knowledge networks, civil liability for nuclear damage, the Agency's safety standards, and education and training.

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

### **B.1. Recent and ongoing activities**

3. In recent years, the General Conference has encouraged the Secretariat to develop approaches to support nuclear power infrastructure in Member States either contemplating the introduction of nuclear power for the first time or expanding an existing nuclear power programme. In this regard, numerous Member States have expressed the desire for clearer and more practical guidance on establishing and developing a sound safety infrastructure supporting a national nuclear power programme, including adequate and stable financing, organizational structure, staffing, an internal

management system and attributes of the regulatory body, as well as technical aspects, such as safety assessment and site selection and evaluation.

4. Embarking on a nuclear power programme and establishing a national safety infrastructure are complex and dedicated processes that include the development of a legal and governmental framework for safety; as well as training and building competencies of nuclear stakeholders, in particular the regulatory body, the operator and the technical support organization. Ratification and implementation of international legal instruments and the establishment of bilateral or multilateral arrangements are key elements of this process.

5. As described in the Agency's Safety Fundamentals No. SF-1 *Fundamental Safety Principles*, the prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks. It also states that an effective legal and governmental framework for safety, including an independent regulatory body, must be established and sustained. Even so, it is important to continue the international dialogue for defining the responsibilities of vendors in providing support to the operating organizations to ensure safe operation and the responsibilities of the regulators of vendor countries in assisting in the establishment in the buyer countries of a regulatory framework and of a competent regulatory body with the appropriate regulatory functions. The Agency will hold a follow-up workshop on issues for new entrants to nuclear power in November 2009 to further understand new entrants' current issues, needs and expectations; establish a common international understanding of responsibilities of vendor countries and new entrants; and discuss ways to share experience and achieve confidence regarding new entrants' infrastructure.

6. In 2007, the Agency published *Considerations to Launch a Nuclear Power Programme* and a report entitled *Milestones in the Development of a National Infrastructure for Nuclear Power* (Milestones document). These documents take a comprehensive approach and describe three phases in the development of a nuclear power programme.

7. Furthermore, the International Nuclear Safety Group (INSAG) publication *Nuclear Safety Infrastructure for a National Nuclear Power Programme Supported by the IAEA Fundamental Safety Principles* (INSAG Series No. 22) defines 'safety infrastructure' as the set of institutional, organizational and technical elements and conditions established in a Member State to provide a sound foundation for ensuring a sustainable high level of nuclear safety. The publication uses a phased approach similar to the one developed in the Milestones document.

8. During the reporting period, the Department of Nuclear Safety and Security provided assistance and support to Belarus, Chile, Egypt, Estonia, Jordan, Philippines and United Arab Emirates regarding the safety infrastructure required for introducing a nuclear power programme. This support ranged from development of human resources and training, to development of energy options, to site survey and site selection.

## **B.2. New Safety Guide**

9. Numerous Member States have expressed the necessity for clearer and more practical guidance on how to apply the entire suite of the Agency's safety standards in the most effective, efficient and sustainable manner, during the development of a national nuclear power programme. Taking into account this need and the Agency's safety standards structure, the Agency is preparing a Safety Guide entitled *Establishing a Safety Infrastructure for a National Nuclear Power Programme* (DS-424). The current draft of DS-424 is well advanced and was discussed at the June 2009 meetings of the safety standards committees. It is intended to be a roadmap on the progressive application of the Agency's safety standards to ensure a high level of safety during the three phases of a nuclear power programme consistent with the milestones established in the Milestones document. The content of DS-424 is

drawn from the Safety Standards Series and addresses all necessary safety considerations with the appropriate detail.

### **B.3. Review services**

10. To assess implementation of or compliance with the Agency's safety standards, the Secretariat will offer tailored versions of its safety review services (Integrated Regulatory Review Service (IRRS), Operational Safety Review Team (OSART), siting and design reviews, Safety Culture Assessment Review Team (SCART)), based on the guidance provided in draft Safety Guide DS-424. The aim of these review services is to achieve and maintain a high level of safety.

11. The Secretariat is also developing a holistic peer review entitled the Integrated Nuclear Infrastructure Review (INIR) service based on document NG-T-3.2: *Evaluation of the Status of National Nuclear Infrastructure Development*. INIR will cover all 19 areas identified in the Milestones document, including safety, at an overview level.

12. Taken together, the tailored safety review services and INIR will provide Member States with a comprehensive assessment of the readiness of their safety infrastructure for nuclear power. The interface between INIR and the tailored safety review services will be transparent to Member States.

### **B.4. Capacity building and education and training**

13. Numerous training courses supporting capacity building for new entrants exist in order to provide for the application of the Agency's safety standards. Specific training programmes are planned to be developed to address more general and global safety issues related to the establishment of a national nuclear safety infrastructure.

14. Such training programmes will build from existing programmes and additional issues such as planning and interfaces between different components of the national safety and security infrastructure will be included. These programmes will also aim at developing the capacity of Member States to perform self evaluations, thus moving from traditional, individual training to institutional and organizational support.

15. A regional approach is envisaged for these training programmes, in order to foster sharing of information and experience between Member States. Bilateral or multilateral arrangements with Agency support and coordination will be encouraged to perform mutual or peer evaluations of Member States' progress to eliminate gaps and share knowledge with regard to their nuclear power programmes.

## **C. Regulatory effectiveness**

### **C.1. Integrated Regulatory Review Service**

16. The Integrated Regulatory Review Service (IRRS), the Agency's legal and governmental infrastructure related peer review service, continues to provide both nuclear and non-nuclear power Member States with opportunities for mutual learning and sharing in order to strengthen the effectiveness of their regulatory infrastructures. The service utilizes a modular approach such that Member States can select the appropriate areas for detailed and thorough review. The participation of senior regulators from Member States as peer reviewers provides for sharing information and

experiences regarding various regulatory approaches and policy issues, as well as contributing to the harmonization of regulatory systems worldwide. A vital and integral part of the IRRS process is the regulatory self-assessment against the Agency's safety standards. Member States can thus take corrective actions as necessary to enhance the overall regulatory effectiveness and ultimately improve nuclear safety. Over the period covered by this report, the Agency conducted three IRRS missions to Canada, Peru and Ukraine, as well as a follow-up mission to France. The IRRS mission to Ukraine included a peer review of the emergency preparedness and response aspects of the national regulatory system.

## **C.2. Enhancing regulatory effectiveness**

17. To support Member States as they continuously improve their regulatory control and inventory of radiation sources, the Agency has been regularly improving the Regulatory Authority Information System (RAIS), taking into consideration Member States' feedback and suggestions. The latest stage of improvement, the 'RAIS Web Portal', was released in 2008 and provides a web interface for RAIS 3.0, which could be used, for example, by inspectors in the field, regional offices of regulatory bodies and by authorized representatives of facilities to access facility data. RAIS regional workshops were held in 2008 in Austria and Ghana. RAIS was also presented and discussed in a European Union (EU) workshop on the operation of a national register of high activity sealed radioactive sources held in Berlin in March 2009. The Agency has developed the Radiation Safety Information Management System (RASIMS), which is a collaborative platform allowing Secretariat and Member State counterparts to work together on identifying and meeting Member State radiation safety needs.

18. Key aspects of enhancing regulatory effectiveness are measurement, assessment and improvement of performance using the Agency's safety standards as the basis. In addition to peer review mechanisms, such as IRRS, self-assessment methodologies have proven to be of great benefit. To complement IRRS, the Agency has developed a methodology for self-assessment and tools to guide regulatory bodies in performing their own review. The electronic self-assessment tool has been specifically designed to assist individual countries in performing a self-assessment of their national infrastructure for safety. A technical meeting was organized in December 2008 to validate the self-assessment methodology. Starting in 2009, the methodology and tools are being disseminated to all Member States. The Agency conducts national workshops on self-assessment during the preparatory phase of IRRS missions to assist regulatory bodies in that exercise.

## **C.3. Lessons learned from IRRS**

19. In November 2008, the Spanish Nuclear Safety Council (CSN), in cooperation with the Agency, conducted a workshop on lessons learned from the IRRS mission to Spain. The feedback from Member States, and the lessons learned from previous missions, continues to provide important information regarding the implementation of Agency safety standards.

20. An internal review of IRRS missions conducted over the past three years has provided insights into areas commonly identified as needing improvement. Preliminary results indicate that areas for improvement include: coordination between various national regulatory authorities; lack of well defined, comprehensive, long term waste management strategies and plans; effectively regulating the implementation of operating experience, safety management and safety culture; and staffing and resources.

21. While IRRS missions have proved to be very successful in peer-reviewing countries with relatively mature regulatory infrastructures, experience shows that advisory-type missions consisting of a smaller group of experts are more suitable for countries that are in the early stages of developing

such infrastructures. Advisory missions on regulatory infrastructure have been carried out in Angola, Burkina Faso, Burundi and Mozambique.

22. The Agency is organizing the International Conference on Effective Nuclear Regulatory Systems: Further Enhancing the Global Nuclear Safety and Security Regime, to be hosted by the Government of South Africa from 14 to 18 December 2009 in Cape Town. The Conference will build upon the results of the first International Conference on Effective Nuclear Regulatory Systems held in Moscow, Russian Federation from 27 February to 3 March 2006 to review and assess the effectiveness of the global nuclear safety and security regime and to propose future actions to further enhance it.

## **D. Knowledge networks**

23. Thematic and regional safety networks continue to capture, create, analyse and share nuclear knowledge. In addition to the networks described in this chapter, thematic networks are discussed where appropriate throughout the report.

### **D.1. Global nuclear safety and security network**

24. The Secretariat has established a prototype of the global nuclear safety and security network (GNSSN), based on the structure of the Agency's safety standards and security guidance, and various IT solutions are being investigated. It is expected that the roadmap for the GNSSN will be presented at the International Conference on Effective Nuclear Regulatory Systems in South Africa in December 2009.

25. The GNSSN is the set of existing networks, such as the Asian Nuclear Safety Network and the Ibero-American Nuclear and Radiation Safety Network, and other internationally accessible information and data sources. The aim of the GNSSN is to ensure that critical knowledge, experience, and lessons learned about nuclear safety and security are exchanged as broadly as they need to be. The GNSSN constitutes the framework for knowledge networks in the global nuclear safety and security regime, related to the sharing of information and knowledge among the global expert community.

26. One section of the GNSSN will be the International Regulatory Network (RegNet). RegNet will serve the specific needs of regulators and relevant international organizations by strengthening and enhancing existing networks. RegNet will include areas for the Integrated Regulatory Review Service, generic safety issues, the Radiation Safety Regulators Network (RaSaReN), and country nuclear regulatory profiles.

### **D.2. Asian Nuclear Safety Network (ANSN)**

27. The ANSN was launched in 2002 to pool, analyse and share nuclear safety information, existing and new knowledge and practical experience among Asian countries. Today, the ANSN is also a platform for facilitating sustainable regional cooperation and for creating human networks and cyber communities among the specialists of those countries. At the beginning of 2009, Singapore officially joined the ANSN, which now has 15 participating countries.

28. ANSN-participating country Ministers and senior officials responsible for nuclear safety attended the 2<sup>nd</sup> meeting of the Nuclear Safety Strategy Dialogue of the ANSN held in Seoul, Republic of Korea, on 10 April 2009. The purpose of the meeting was to discuss broader strategy and policy issues that are intended to promote regional cooperation in the establishment and continuous improvement of

nuclear safety infrastructure and capacity building in Asia, particularly the vision for the ANSN by the year 2020. While recognizing that the primary responsibility for safety rests with the States, the participants confirmed that, to help fulfil this responsibility, it was necessary to enhance bilateral, regional and international cooperation for capacity building; sharing of knowledge and lessons learned; peer review and advisory services; and education and training. They gave their full support to the ANSN to achieve a sustainable regional network to contribute to the continuous improvements of Member States' nuclear safety infrastructure.

29. Two ANSN steering committee meetings took place during the reporting period. During the 8<sup>th</sup> steering committee meeting held in Malaysia in October 2008, the participants approved the programme of activities for 2009. Held in conjunction with the meeting, a special event entitled the Malaysian ANSN Caravan presented the ANSN to some 300 specialists of the scientific community of Malaysia. The event was organized by the Atomic Energy Licensing Board in cooperation with the Ministry of Science, Technology and Innovation.

30. The 9<sup>th</sup> steering committee meeting was held in Indonesia in May 2009 with the objective of reviewing the ANSN activities since the 8<sup>th</sup> meeting and to agree on a detailed work plan for the next six months based on the recommendations to the steering committee made by the participants of the 2<sup>nd</sup> meeting of the Nuclear Safety Strategy Dialogue. More than 60 concrete actions of varied importance were listed and approved, with a responsible body and a target date for each action, including the approval of the concept of a virtual technical support organization within the ANSN, the creation of a topical group on siting and the development of public awareness activities.

31. The IT network has been reinforced with an improved ANSN website (<http://www.ansn.org>) with more centralized and updated features and enhanced security.

### **D.3. Ibero-American Nuclear and Radiation Safety Network**

32. The Ibero-American Forum of Radiological and Nuclear Regulatory Agencies was created in 1997 and now includes Argentina, Brazil, Chile, Cuba, Mexico, Spain and Uruguay. The Forum promotes a high level of safety by reviewing and analysing issues of interest to the region in nuclear and radiation safety and security and identifies regional regulatory problems and proposes policy and action plans towards improving safety. The Forum's technical programme gives priority to national and regional needs and to knowledge management for regulatory purposes through the Ibero-American Nuclear and Radiation Safety Network<sup>1</sup>.

33. In 2008, the Forum concluded technical projects on safety and regulatory control of radiotherapy through the application of risk identification and analysis techniques and on continuous improvement of the regulatory framework for the control of medical exposure in Ibero-America. The outcomes of these projects were disseminated at the 12<sup>th</sup> International Congress of the International Radiation Protection Association in October 2008 so other countries in the region could take advantage of the work done. As a follow up, the Agency conducted a regional training course on prevention of accidental exposure in radiotherapy and risk analysis in March 2009 in Chile, with 66 participants, including radiation oncologists, medical physicists and regulators, from 18 Member States. A workplan was formulated in order to apply the new knowledge to improve safety in hospitals in these countries. The outcome of this work will be shared and disseminated in 2010.

34. The Forum started a project on NPP safety in January 2009 to elaborate technical advice to develop and improve regulatory practices on plant ageing and safe life extension in the region. A project on strategies for the prevention, detection and response to the inadvertent presence of

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<sup>1</sup> [http://www.foroiberam.org/view/pre\\_home.php](http://www.foroiberam.org/view/pre_home.php)

radioactive material in metal recycling and associated processes was approved by the Forum Plenary at its meeting in June 2009.

#### **D.4. Forum of Nuclear Regulatory Bodies in Africa**

35. Following preliminary meetings in the margins of the 51<sup>st</sup> and 52<sup>nd</sup> regular sessions of the General Conference, the Forum of Nuclear Regulatory Bodies in Africa (FNRBA) was officially launched by the signature of a charter<sup>2</sup> in Pretoria, South Africa in March 2009. The establishment of FNRBA will advance regional cooperation by promoting a common understanding of radiation and nuclear safety regulatory issues, facilitating information exchange, strengthening radiation and nuclear safety infrastructure across the region, addressing present and future nuclear safety challenges, and creating a uniform platform for coordinating support and partnership initiatives.

### **E. Civil liability for nuclear damage**

36. The 9th meeting of the International Expert Group on Nuclear Liability (INLEX), established by the Director General, met from 24 to 26 June 2009 at Agency Headquarters in Vienna. Major topics discussed during the meeting included, inter alia, the status of ratification of the international nuclear liability conventions, the European Commission Impact Assessment Study, 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 (and possibly also the Convention on Supplementary Compensation for Nuclear Damage (CSC)) and future INLEX outreach activities. The Group now also includes an observer from the European Commission (EC).

37. On the status of ratification of the international nuclear liability conventions, the experts reaffirmed their support for working towards establishing a global nuclear liability regime and in that connection provided some insight on the latest efforts made at the national level towards reaching this objective, especially in light of the recent letter sent by the Director General to Member States encouraging the latter “to give due consideration to adhering to the CSC.”

38. The Group was informed however that the contracting parties to the Paris Convention on Third Party Liability in the Field of Nuclear Energy adopted under the auspices of the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA) have agreed that, in connection with the future simultaneous ratification of the 2004 Protocol to the Paris Convention, each contracting party would make a reservation to the Paris Convention providing in essence for reciprocity in the implementation of the Paris Convention, in particular with regard to compensation amounts. Some experts expressed concern that this approach could have the effect, through Article IV of the Joint Protocol, not to afford the full benefits to states party to the Vienna Convention and the Joint Protocol.

39. On the European Commission Impact Assessment Study, the Group noted that the Impact Assessment has been reclassified by the EC as a ‘legal study’ with no anticipated proposals for legislative action. The Group reaffirmed its conclusions reached last year expressing concern over the

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<sup>2</sup> Angola, Botswana, Burkina Faso, Cameroon, Côte d’Ivoire, Democratic Republic of the Congo, Ethiopia, Gabon, Ghana, Kenya, Libyan Arab Jamahiriya, Malawi, Mali, Morocco, Namibia, Niger, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania and Zimbabwe are signatories to the charter.

alternatives considered by the EC, especially the suggestion that Euratom could act in a way which may impair treaty relations between EU and non-EU states, and encouraged the EC to continue to look at all the possible avenues available, including those that would contribute to strengthening the global nuclear liability regime such as the CSC or the Joint Protocol. The Group also encouraged the Secretariat to continue to convey the Group's views in all forums discussing the issue, including the currently proposed EU working group on nuclear liability.

40. On the issue of the German proposals, the Group took note of the fact that on 6 June 2009 the German delegation submitted to the Secretariat a further Explanatory Note in support of its proposals. The Explanatory Note, which elaborates on the technical background of the proposals, was forwarded as before to the competent Agency Safety Standards Committees (Radiation Safety Standards Committee and Waste Safety Standards Committee) for their technical assessment, which is ongoing, prior to their consideration by INLEX.

41. On INLEX outreach activities, the Group took note of the preparations which are under way for organizing the fourth workshop on liability for nuclear damage for countries that have expressed an interest in embarking on a nuclear power programme, currently scheduled to be held in December 2009 in United Arab Emirates. In addition, INLEX discussed further outreach activities and suggested that the fifth workshop be held for countries in Central and Eastern Europe and Central Asia.

## **F. The Agency's safety standards programme**

42. The set of thematic and facility specific Safety Requirements was complemented with the publication of Safety Requirements No. NS-R-5, *Safety of Nuclear Fuel Cycle Facilities*, in November 2008, and General Safety Requirements Part 4, *Safety Assessment for Facilities and Activities*, and Part 5, *Predisposal Management of Radioactive Waste*, in May 2009.

43. Following approval by the Commission on Safety Standards (CSS) at its meeting in May 2008, the CSS adopted a long term structure and format for Safety Requirements, including the establishment of General Safety Requirements integrating all thematic areas in a coherent and harmonized set of seven publications, complemented by a series of facility and activity specific Safety Requirements. This is being complemented by the revision of Safety Requirements No. GS-R-1, *Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety*, and the revision of *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (BSS).

44. The CSS also adopted criteria for a long term user-friendly set of Safety Guides, which, in March 2009, resulted in the establishment of an optimized reference set of Safety Guides.

45. The Secretariat also finalized in April 2009 a first complete document on strategies and processes for the establishment of the Agency's safety standards. The draft was developed in close cooperation with the chairpersons of the safety standards committees and incorporates the comments received in 2008 from the safety standards committees, as well as the policy papers approved by the CSS on the long term structure of the safety standards. The implementation of the policies and strategies is addressed through the description of the relevant processes, and associated responsibilities and functions. The document is being reviewed by the safety standards committees and will be submitted to the CSS for its meeting in October 2009.

46. With regard to the interface and synergies between the Agency's safety standards and the Nuclear Security Series, a joint session of CSS and the Advisory Group on Nuclear Security (AdSec) in April 2009 initiated an exchange of views on the issues related to safety and security synergies and interfaces, in particular to study the feasibility of the establishment of nuclear safety and security standards that would fully cover nuclear safety and security. The International Nuclear Safety Group (INSAG) is finalizing a report on the relationship between safety and security (INSAG-24) that may serve as a model for future safety standards.

47. The Agency's four safety standards committees reviewed BSS draft 1.0 of June 2008, resulting in more than 1200 comments. During a joint meeting of the Radiation Safety Standards Committee (RASSC) and the Waste Safety Standards Committee (WASSC) in November 2008, participants discussed the substantive issues raised in the comments and provided guidance for the continued revision of the BSS on most of these issues. The Secretariat held three further drafting meetings and one review meeting with the potential sponsoring organizations in February, March and April 2009 to develop draft 2.0 of the revised BSS. Draft 2.0 of the revised BSS was provided to the safety standards committees on 7 May 2009, for comment and review at their meetings held in June 2009. As requested by the General Conference in resolution GC(51)/RES/11, the Secretariat has prepared a document to justify changes from the current BSS.

## **G. Capacity building including education and training in nuclear, radiation, transport and waste safety**

48. The Agency continues to promote an approach to capacity building where expert advice, peer reviews, knowledge networking, human resources and education and training are supported in an integrated manner.

### **G.1. Education and training in nuclear safety**

49. Advice and tools were further developed on systematic training needs assessments, human resources, planning and management of competencies for regulatory bodies. Also the importance of sustainability, building up in-house learning programmes, enhancing train-the-trainer skills using Agency resources and materials for learning and knowledge sharing was emphasized through guidance and advice in various Member States.

50. The Basic Professional Training Course on Nuclear Safety underwent a comprehensive programme of revision and upgrading. New multimedia based training materials were produced and the web resources redesigned to provide improved accessibility and dissemination. The use of the web was subject to a survey and enlarged to support networking and sharing of information on training.

51. Hundreds of DVDs with materials and presentations in support of training were requested through the Agency's website and delivered to Member States. As a result of the high number of requests for video presentations and audio visual training materials, an internal process for managing the materials, copying the video presentations and enhancing the software for production was put in place and is still under development.

52. It is still a challenge to produce guidance for Member States to use the large volume of training material and documents available. There is a need to produce train-the-trainer packages to design and develop in-house training programmes using the training materials available to them. Proper train-the-trainer aids, in particular the Basic Professional Training Course on Nuclear Safety and the Regulatory

Control of Nuclear Power Plants textbook, should be developed in order to improve the use and effectiveness of self study of these materials and develop in-house training.

## **G.2. Education and training in radiation, transport and waste safety**

53. A steering committee of experts nominated by Member States meets once per year to oversee the implementation of the Agency's strategic plan on education and training activities in the area of radiation, transport and waste safety. So far, good progress has been made at the regional level, but more work is needed at the national level.

54. A long-term agreement in the area of education and training between the Agency and Argentina was concluded in 2008. Similar agreements are expected in the future with the establishment of regional training centres to host Agency postgraduate educational and specialized training courses related to radiation safety.

55. The Agency continued its efforts towards capacity building in Member States by running postgraduate educational courses in radiation protection and the safety of radiation sources in Argentina, Belarus, Greece, Malaysia, South Africa and Syrian Arab Republic, as well as many short courses in specialized aspects of radiation safety. Material was made available for participants prior to attending the postgraduate courses, and training material for lecturers was made available in Arabic, English, Russian and Spanish.

56. The Agency's training package on authorization and inspection of radiation sources continues to receive great interest. Upon the request of Member States, five courses were organized in the reporting period, with more courses planned.

57. The Agency organized more than 20 regional training events relating to radiation, transport and waste safety within the framework of technical cooperation regional projects, national projects and regional cooperation agreements during the reporting period.

58. Under the Action Plan for Occupational Radiation Protection, illustrative materials in radiation protection for radiation workers and reference materials for labour instructors have been developed and are under review.

## **G.3. Education and training in emergency preparedness and response**

59. In 2008, the Agency offered 20 training courses (at the regional and national levels) in various areas of emergency preparedness and response. More than 500 specialists were trained at these courses through lectures, work sessions, drills and exercises. The training covers a wide audience from emergency managers and planners to staff of regulatory authorities and civil protection personnel.

# **H. Nuclear and radiological incident and emergency preparedness and response**

## **H.1. Communication during emergencies**

60. There continues to be a need to establish clear communication procedures in response to any type of radiation 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 an

emergency preparedness and response manual on communicating with the public during a nuclear or radiological emergency.

61. The International Nuclear and Radiological Event Scale (INES) has been used for more than 15 years. During this period, it has been extended and adapted further to meet the growing need for communication of the significance of all events associated with the transport, storage and use of radioactive material and radiation sources. In July 2008, *The International Nuclear and Radiological Event Scale User's Manual*, which consolidates additional guidance and replaces earlier publications, was endorsed by the INES Advisory Committee and national officers representing the INES participating states.

62. The Secretariat is continuing with the development of a unified system that will replace the Agency's current Early Notification and Assistance Conventions Website (ENAC) and the Nuclear Events Web-based System (NEWS), as encouraged by the General Conference in resolution GC(52)/RES/9.A

## **H.2. Assistance and Appraisal Missions**

63. 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 Kyrgyzstan, Montenegro, Tunisia and Uzbekistan to provide an independent assessment of their emergency preparedness and response programmes and capabilities, and their conformance with international standards. The missions revealed that the awareness of the need for a sound legal basis, properly functioning regulatory system and appropriate infrastructure to respond to the nuclear or radiological incidents and emergencies is growing in all Member States visited.

64. As mentioned in section C.1, the Agency's IRRS also now includes a module for the peer review of the emergency preparedness and response aspects of national regulatory systems.

## **H.3. Exercises and drills**

65. In order to fully assess and improve response capabilities, there is a need to increase the number of drills and exercises at all levels (local, national and international). It is also important to expand the scope of these exercises and drills to include both safety and security components.

66. It was also confirmed through the so-called ConvEx3 emergency exercises, of which the last one was organized in Mexico at the Laguna Verde NPP in July 2008, that the Agency should strengthen its emergency preparedness and response capabilities to better coordinate international response to radiation emergencies, in particular to a large scale emergency. Main Agency activities to improve the emergency preparedness and response programmes include:

- assistance to Member States in minimizing the impact of nuclear or radiological incidents and emergencies;
- building and enhancing national and global emergency preparedness and response capabilities;
- enhancing the Agency's capability to respond to large scale emergencies; and
- providing relevant and reliable information on incidents and emergencies to Member States, international organizations and the public.

## **H.4. Response Assistance Network (RANET)**

67. There is growing recognition that national safety infrastructure must include resources and arrangements for responding to radiological incidents and emergencies. However, only a few Member States have adequate capabilities to respond to a major radiological emergency. Although all Member

States require plans and core resources to deal with radiological incidents and emergencies, it is not practical for all to have the full range of specialized capabilities. The Agency's RANET provides a convenient method of registering national capabilities and matching capabilities with needs.

68. RANET is now operational and has been used as necessary by the Agency in responding to requests for assistance from Member States. By the end of July 2009, 15 Member States had registered their national assistance capabilities with RANET. Although this is a good start, all Member States are encouraged to register their assistance capabilities with RANET.

## **I. Nuclear installation safety**

### **I.1. Natural events and seismic safety**

69. Recent major natural events affected nuclear installations in a number of countries, particularly in Asia, beyond the original design levels. The devastating December 2004 Indian Ocean tsunami and earthquakes in Japan in 2003, 2005 and 2007 and in China in 2008 all resulted in flood, geological and/or vibratory ground hazards of intensities higher than expected by even the most stringently established design basis.

70. In all cases, affected nuclear installations responded in a safe manner during and following the event. In some cases, there was significant damage to non-safety related structures, systems and components and to site and local infrastructure. There was a need to conduct intensive and comprehensive integrity and functionality assessments at affected nuclear installations; understand why the original estimated hazard was exceeded; reassess the estimated hazard based on the new information and the lessons learned; and re-evaluate and upgrade the structures, systems and components to the new hazard parameters.

71. The immediate response of the Agency to all these natural events was threefold:

- upon request, assisting affected Member States in the aftermath of the event;
- promptly disseminating all lessons learned to the world nuclear community;
- launching the process of reviewing and revising the related safety standards to update them incorporating the lessons learned from those events. Four Safety Guides are currently under revision and a new Safety Guide is being prepared. A number of supporting documents are also under development.

72. Two extrabudgetary programmes have been launched with many Member States and institutions participating in numerous areas of scientific and technical research and development.

73. The extrabudgetary programme on tsunamis is addressing the issues of tsunami hazard assessment and response to nuclear emergencies generated by tsunami hazards. Seventeen institutions from seven Member States are participating in the programme. Assessment criteria and related computer software were distributed, and training courses and workshops were conducted during 2008 and 2009 and Member States in the Asia and Pacific region are already receiving the benefits. An online seismic and tsunami notification system is under development for providing information on the occurrence of these events and identifying those nuclear installations that may be affected.

74. The extrabudgetary programme on seismic safety includes 42 participating institutions from 20 Member States in five working groups which are dealing with the most critical issues raised by the recent events. As a result of all these actions the Agency's International Seismic Safety Centre, launched during the 52<sup>nd</sup> regular session of the General Conference, has become the world focal point

on these matters, including the constitution of an ad-hoc scientific committee of recognized experts from around the world.

75. These natural disasters have also drawn attention to emergency preparedness and response issues in these types of emergencies. The Agency is developing a safety report that will contain guidance on pre-event planning, post-event plant response and how to build effective emergency preparedness and response capabilities to respond to nuclear or radiological emergencies triggered by natural disasters.

## **I.2. Safety review service missions**

76. NPP utilities have long recognized the importance of self-assessment and peer review. A number of mechanisms, including the Agency's Operational Safety Review Team (OSART) programme and World Association of Nuclear Operators (WANO) peer reviews, are available to identify whether the processes necessary for nuclear safety are in place and effective.

77. At the request of Contracting Parties to the Convention on Nuclear Safety, the Agency is preparing an 'issues and trends' paper based on an analysis of the findings of Agency safety review service and expert missions since 2007. In addition to identifying a number of areas of strong performance, preliminary results of the analysis identified a number of areas where improvements are needed such as: better attention by operating staff conducting field and control room observations; fire safety; maintenance practices, including foreign material exclusion activities; management systems; and instrumentation and control equipment replacement. The final issues and trends paper will be published by the Agency by 30 September 2009, in time for Contracting Parties to prepare their national reports for the 5<sup>th</sup> Review Meeting in 2011.

## **I.3. Learning from experience**

78. One of the keys to enhancing nuclear safety is the ability to learn from experience. As well as addressing the causes of more significant events occurring nationally or internationally, this should also include learning from the causes of low level events, such that more significant events are prevented. The value of an effective operating experience programme is generally well recognized. Numerous 'potential' events have not occurred as a result of learning from experience. However, evidence from recent OSART and WANO reviews, together with the fact that similar events repeatedly occur, indicates that the safety benefits of a comprehensive operating experience programme are not yet being fully realized at all NPPs. The INSAG publication *Improving the International System for Operating Experience Feedback* (INSAG Series No. 23) covers the need for a more effective system for operating experience feedback and during the INSAG meeting in April 2009 an Agency action plan to address the improvements identified in INSAG-23 was supported. INSAG also requested that the Agency assess the use by Member States of the available data.

79. Determining accurately the root causes of an event is fundamental to allow the identification of necessary actions to prevent future events. Root cause analysis can also support measures to identify and address common cause vulnerabilities in a number of events. However at several NPPs, the root cause analysis process is not being deployed widely or effectively enough to realize the potential benefits.

80. Several findings from reviews at NPPs indicate that corrective actions which effectively address the root causes of an event are not being implemented in a rigorous or timely manner. Some of the weaknesses observed in this area include delays in implementation of corrective actions and the absence of effectiveness reviews of implemented corrective actions. Without the proper implementation of these corrective actions, the reporting and analysis activities will have very limited value in improving safety of NPPs.

81. Results from Peer Review of Operational Safety Performance Experience (PROSPER) missions carried out recently reflect the weaknesses in use of low level events, and in corrective action programmes, as identified above. In order to expand the benefits of the review of operating experience programmes, the Agency will offer its PROSPER service to regulatory bodies, in addition to utilities and NPPs.

82. The Agency has conducted a review of the key lessons learned from event reports submitted to the Incident Reporting System (IRS). The review identified weaknesses in a number of areas which have contributed to events at NPPs. These include inadequate communications, failure to share and learn from operating experience, and insufficient controls during installation of new equipment. It should be noted that further enhancements to the international operating experience system, including IRS, are planned to be implemented following on from the improvement opportunities identified in INSAG-23.

83. In order to enhance the quality of the Agency's safety standards, a meeting on feedback from IRS topical studies and events with regard to the safety standards was held in Vienna from 4 to 8 May 2009. Meeting participants reviewed the recommendations raised in the IRS topical studies and selected events in the IRS database against the safety standards. The meeting confirmed that a high percentage of the operating experience feedback from IRS had already been incorporated in the safety standards, while the identified gaps provided important feedback for enhancing the safety standards.

#### **I.4. Generic approach to new reactors**

84. As a response to renewed interest in the development of nuclear energy capacity across the globe, vendors are designing new reactors, including innovative systems, to meet the growing demand for safer and more economical nuclear power generation. A Generic Reactor Safety Review (GRSR) process enables Member States to have an early evaluation of safety cases of new reactor designs with regard to the Agency's safety standards. Consequently, such safety evaluations, conducted against selected sets of safety standards, contribute to more effective management of subsequent activities within a global framework consistent with a harmonized approach to safety worldwide.

#### **I.5. Safety culture**

85. While safety culture is now a commonly used term, it continues presenting challenges to nuclear operators and regulators. As noted during the 4<sup>th</sup> Review Meeting of Contracting Parties to the Convention on Nuclear Safety held in April 2008, fundamental challenges include oversight and assessment of safety culture. Even in those Member States where systematic assessment of safety culture is in place, there is a need for a common understanding of how to oversee licensee safety culture and of how to assess, from the licensee's point of view, its own safety culture. In this regard, the Agency implemented national and regional meetings in June 2009 for East European Member States addressing this need. Planning has also started for a technical meeting in 2010 at the Agency's Headquarters on safety culture oversight. The Agency will conduct a Safety Culture Assessment Review Team (SCART) mission to Laguna Verde NPP in Mexico in the fourth quarter of 2009.

#### **I.6. Interface between nuclear safety and nuclear security**

86. Safety and security serve a common purpose — the protection of people, society and the environment. There is increasing recognition that safety measures and security measures must be designed and implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security. The Agency continues to explore opportunities for synergy between safety and security, such as the joint session of CSS and AdSec mentioned in paragraph 46.

## **I.7. Technical knowledge aspects of infrastructure**

87. With the renaissance of nuclear power programmes and potentially significant deployment of new NPPs worldwide, a need arises for rigorous safety assessment capabilities in support of risk informed decision making for nuclear facility design, procurement, construction, testing, operation and maintenance, surveillance, inspection, shutdown, refuelling, pre-decommissioning and regulatory activities. To meet this demand, a Safety Assessment Education and Training (SAET) Programme based on the Agency's safety standards is being developed. The programme foundation is a set of rigorous knowledge requirements developed to provide Member States with a benchmark for the evaluation of educational needs of organizations involved in nuclear safety, and for planning and developing educational programmes on safety assessment at these organizations. The second important function of the knowledge requirements is to serve as the standard, as well as guidance for the development of training materials and courses. Addressing the broad needs in safety assessment education, from management through analysis, the SAET programme is organized in several modules and in two levels: essential safety assessment knowledge and practical skills. Advanced training methods using analytical simulators and distance learning systems are being prepared as well.

## **I.8. Safety of research reactors**

88. An international meeting on the application of the Code of Conduct on the Safety of Research Reactors was held by the Agency in Vienna in October 2008 with the participation of 64 delegates from regulatory bodies and operating organizations of 41 Member States. In addition to exchanging information on the safety status of research reactors and good practices on the application of the Code, the delegates presented their country reports which included self-assessments on the application of the Code. The country reports reflected progress in implementation of the provisions of the Code but also reflected continuing challenges in some areas. The meeting provided recommendations to further enhance the application of the Code, including the organization of periodic regional meetings and triennial international meetings, at a time shortly after the Review Meetings of the Convention on Nuclear Safety, and with a similar review process. In response to the meeting's recommendations, activities are being implemented to improve networking between regulatory bodies and operating organizations, develop technical and safety infrastructures needed for research reactor new builds, and to address common safety issues identified from Member State self-assessments.

89. In September 2008, the Agency published the proceedings<sup>3</sup> of the International Conference on Research Reactors, held in Sydney, from 5 to 9 November 2007. The Agency continued to implement activities addressing the Conference's recommendations. This included the organization of two regional meetings for Africa (October 2008) and Latin America (December 2008) on safety review of research reactors. As part of the efforts to further enhance safety management of research reactors, a regional workshop was held in Vienna in October 2008 on safety culture in research reactor operating organizations in Eastern European countries, and a workshop aimed at enhancing research reactor safety committees was held in the USA in December 2008. In addition, work is being completed on updating the Agency's Research Reactors Database to include information on safety, and on establishing a research reactor information network.

90. 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. Currently, 51 Member States have joined the system, including three that joined in 2008. Work is in progress to upgrade the web-based IRSRR and use a common platform with the Incident Reporting System (IRS) for NPPs and the Fuel Incident

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<sup>3</sup> [http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2007/cn156/cn156\\_ConferenceReport.pdf](http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2007/cn156/cn156_ConferenceReport.pdf)

Notification and Analysis System (FINAS). The updated version of the system will be operational in September 2009, in time for the sixth meeting of the IRSRR national coordinators, to be held in November 2009 in Petten, Netherlands.

## **I.9. Safety of fuel cycle facilities**

91. Following the publication of Safety Requirements No. NS-R-5, *Safety of Nuclear Fuel Cycle Facilities*, in 2008, another three Safety Guides were approved and will be published in 2009: NS-G-5.1, *Safety of Uranium Fuel Fabrication Facilities*; NS-G-5.2, *Safety of MOX Fuel Fabrication Facilities*; and NS-G-5.3, *Conversion and Enrichment Facilities*. Work is in progress to complete a set of Safety Guides that cover important safety areas of fuel cycle facilities, including reprocessing facilities, storage of spent fuel, research and development, and criticality safety.

92. Safety Requirements No. NS-R-5 provides a basis for the Agency's Safety Evaluation during Operation of Fuel Cycle Facilities (SEDO) missions. Work is being completed to finalize the guidelines for SEDO missions. A follow-up SEDO mission will be carried out in July 2009 at the fuel fabrication facility in Brazil, which received the first SEDO mission in May 2007.

93. The Joint OECD/NEA-IAEA biennial meeting of the FINAS national coordinators and its Advisory Committee meeting was held in Paris in September 2008. The meeting was attended by 23 delegates from 16 Member States. The participants exchanged information on the safety status of fuel cycle facilities and discussed the operational status of FINAS, which is the unique international incident reporting system for fuel cycle facilities. In responding to the meeting recommendations, the system was put in operation in October 2008.

## **J. Radiation safety**

### **J.1. 12<sup>th</sup> International Congress of the International Radiation Protection Association (IRPA 12)**

94. The International Radiation Protection Association Executive Council agreed to a proposal made by the Agency to disseminate the full proceedings of IRPA 12 on the Agency's website. The Agency will also prepare a summary of the Congress as an Agency publication, which will include keynote presentations, conclusions of the sessions indicating the main trends in each area, and a summary by the President of IRPA 12. The publication will also include a CD with the full proceedings. The Agency will convene a meeting of relevant parties at the end of August 2009 to finalize the publication.

### **J.2. Occupational radiation safety**

95. The IRPA 12 conference in October 2008 considered that the objectives of more than 80% of the actions of the Action Plan for Occupational Radiation Protection had been achieved. Cooperation with the International Labour Organization (ILO) will be maintained in order to complete the remaining actions and to evaluate the need for defining and developing new actions.

96. The Agency continues to foster and promote occupational radiation safety in Member States through networking. The most recent network is provided through the new Asia Region ALARA Network (ARAN).

97. The Agency's recently established Information System on Occupational Exposure in the Medical, Industrial, and Research Areas (ISEMIR) has, in collaboration with other international organizations, demonstrated its usefulness in the area of harmonized implementation of radiation protection standards. ISEMIR is a tool for the identification of trends and needs that will be expanded to include waste management and decommissioning activities.

98. The Agency has worked constantly to maintain the quality standards that resulted in the accreditation of its radiation protection monitoring service in 2006. A surveillance audit by the Austrian accreditation authority was held in April 2009 which confirmed the high quality of the services and maintained the validity of the accreditation to 2011.

99. In addition, the Agency has stepped up work on maintaining standards to keep the method accreditation of its radiation protection monitoring service by including an additional laboratory in the accreditation regime. In line with the one-house approach, the equipment radiation monitoring laboratory of the Department of Safeguards was included in the monitoring service. The accreditation now combines individual, workplace and equipment monitoring into a service to protect radiation workers, their workplace, their families and the general public from the negative effects of overdose and radioactive contamination. The Agency's experience with the accreditation process provides a useful model for Member States wishing to obtain accreditation for their services.

100. In March 2009, the Agency conducted a follow-up Occupational Radiation Protection Appraisal Service (ORPAS) mission to Chile to assess progress since the main mission in September 2007. The mission noted that Chile had fully implemented more than 50% of the recommendations from the main mission and all other recommendations had been partially implemented. Human and financial resources were made available where needed for new activities, including purchasing and verification of equipment. Several improvement actions focused on optimization of protection in a few facilities, resulting in better process organization and a reduction in doses to workers. ORPAS complements IRRS and focuses on end-users and technical service organizations.

### **J.3. Medical radiation safety**

101. The Agency continues to address issues on justification of medical exposures. While the increased spread of medical technologies utilizing ionizing radiation brings significant benefit to the global population, the overall proportion of medical exposure relative to the total exposure per capita is rising fast, and there are studies indicating that a significant percentage of radiological examinations might be unnecessary. The Agency, jointly with the EC, will host an International Workshop on Justification of Medical Exposure in Diagnostic Imaging in September 2009, exploring tools to improve this situation in practice, such as communication of risk to health professionals and the public, guidelines for referral of patients and audits of appropriateness of radiological examinations. The Agency is also developing the methodology for a system aimed at addressing long-term recording of cumulative radiation exposure of individual patients.

102. To increase radiation safety in medical radiological procedures, the Agency has designed a web-based system for collecting and disseminating information on characteristics of radiation usage resulting in high exposure of patients. This system, Safety in Radiology (SAFRAD), is initially being piloted in collaboration with a limited number of medical facilities undertaking interventional procedures using X-rays. Efforts are also underway to design an adequate web-based system addressing safety in radiation oncology.

103. Three recently published Safety Reports give advice on radiation protection in new medical imaging techniques: cardiac computed tomography (CT), positron emission tomography/computed tomography (PET/CT) and CT colonography. Exposure of patients increasingly arises from new medical imaging practices and giving up-to-date and timely advice on radiation protection issues in

this rapidly evolving field is a priority. New training material on radiation protection in cardiology and PET/CT has been developed and disseminated and training courses are given to health professionals such as cardiologists, urologists, gastroenterologists and gynaecologists. Key issues and future directions for working with the evolving medical radiation technologies were identified in a satellite session in conjunction with the IRPA 12 meeting.

104. The Agency and the Ibero-American Forum of Radiological and Nuclear Regulatory Agencies have jointly begun the implementation of a programme on avoidance of accidental exposure in radiotherapy through risk analysis and probabilistic safety assessment. The first training course for 18 Member States in Latin America was held in March 2009.

105. The Agency's public website dedicated to advice on radiation protection of patients continues to grow in terms of content and popularity. With links to new material on medical imaging techniques and updates of contents twice per month, the website has now reached a hit-rate of half a million per month. In addition to the current material and advice for health professionals, material for patients undergoing medical exposure is now under preparation for inclusion on the website.

#### **J.4. Exemption and clearance**

106. Metal recycling has become an important industrial activity in all Member States. Radioactive material may become inadvertently associated with scrap metal, potentially causing health, economic and public acceptance problems. In February 2009 at the International Conference on Control and Management of Inadvertent Radioactive Material in Scrap Metal, organized by the Agency and the Spanish Nuclear Safety Council and held in Tarragona, Spain, experiences were shared to contribute towards the resolution of the problems caused by the inadvertent presence of radioactive material in scrap metal. Reducing the magnitude of the problem by prevention, detection and subsequent reaction requires the cooperative efforts of scrap metal carriers, the scrap metal industry, the steel industry, national regulators and radioactive waste management organizations. It was clear that many Member States consider that the main problems come from importing material from other countries. The participants of the conference unanimously recognized the potential benefit that would result from some form of binding international agreement. The Agency, in collaboration with other relevant international organizations, will study the issue to provide a way forward.

107. The conference also addressed the issues surrounding the recycling of metals from the nuclear industry. In several Member States, the nuclear industry is using the clearance concept to determine which materials can be released from regulatory control for recycling. To date, most of the released metals have been used in controlled applications or returned for reuse within the nuclear industry and the release of cleared metals from the nuclear industry for unrestricted use has not yet gained acceptance.

### **K. Safety and security of radioactive sources**

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

108. An increasing number of countries recognize that the Code of Conduct on the Safety and Security of Radioactive Sources provides the foundation for radioactive source safety and security. As of 30

June 2009, 95 States have made a political commitment to implement the Code, of which 53 have additionally 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 77 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. In addition to this widespread acceptance of the Code and the Guidance on a national level, they are also supported by several groups of countries such as Asia-Pacific Economic Cooperation, EU, 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.

109. As a follow-up to previous meetings on sharing information about States' implementation of the Code and the Guidance held in Vienna in 2007 and 2008, the Agency held a technical meeting to discuss certain legal and technical issues and possible strategies related to the management of sealed sources, in particular when these sources are reaching the end of their life cycle, or when orphan sources are detected at borders or during transport. These issues have been raised in previous meetings on sharing of information on States' implementation of the Code of Conduct. Participants in these meetings considered that there was a need for further international discussion on these subjects. As requested in resolution GC(52)/RES/9, the Chair report of the 2008 meeting (Note by the Secretariat 2008/Note 26) was translated into all official languages and was attached to the note verbale announcing the 2009 meeting.

110. The meeting was held in Vienna from 29 June to 1 July 2009 and was attended by 75 experts from 51 Member States and by observers from the EC and the International Source Suppliers and Producers Association. The USA provided extrabudgetary funding to support the participation of experts from States that otherwise could not have attended. The meeting recalled provisions of the Code of Conduct on disused and orphan sources and shared experience in their implementation. There was a general agreement that national strategies for storage and disposal of disused sources by user countries still have to be developed, even if the preferred option remains the return of disused sources to a supplier. There was no common view on actions to be taken when an orphan source is detected at a border.

111. The report of the Chair of the meeting is available as document 2009/Note 38 and will be used as an input for the next meeting on sharing information and experiences about States' implementation of the Code and the Guidance, scheduled for 2010, provided extrabudgetary funding is available.

112. Participants of the International Workshop on Sustainable Management of Disused Sealed Sources: Working Towards Disposal, held in Thailand in January 2009, acknowledged the Agency's efforts to encourage Member States to establish national policies and strategies for lifetime 'cradle to grave' management of sealed radioactive sources. From a long-term management perspective, the disposal of disused sources was recognized as the only sustainable, safe and secure solution. In this respect, the participants encouraged the Agency and Member States with developed skills and experience in radioactive waste disposal to continue their support to developing Member States willing to host pilot projects on borehole disposal. Pilot projects will be instrumental to demonstrate the safety, security, technical feasibility and economical viability of the borehole disposal technology.

## **K.2. National strategies for regaining control over orphan sources**

113. A training package is being developed to complement the 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.

114. The Orphan Source Search and Secure Project assists countries in establishing their capabilities to search for and secure orphan radioactive sources and establish verified source inventories. The necessary capabilities include the establishment of a national strategy to search for and secure orphan sources based on verified national source inventories, qualified and trained staff capable to implement search campaigns, and adequate technical means such as hardware and software for the inventory and search equipment. During the reporting period, assistance, including expert advice on procurement of search equipment and services, was provided to establish these capabilities in Botswana, Democratic Republic of the Congo and Namibia.

### **K.3. Mobile hot cell**

115. The first field operation using a mobile hot cell for removing disused Category 1, 2 and 3 high activity sealed sources from research and medical irradiators and conditioning them for storage in safe and secure storage containers was successfully performed in Sudan in May 2009 by experts from the Nuclear Energy Corporation of South Africa (Necsa), supported by staff of the Sudan Atomic Energy Commission. The concept of a mobile unit for the conditioning of disused high activity radioactive sources was conceived by the Agency. The unit allows international expert teams to render disused high activity radioactive sources safe and secure in those countries that use high activity radioactive sources for beneficial purposes but do not have the infrastructure to process them after termination of the application. Similar operations are planned for other countries, subject to the availability of funds.

## **L. Transport safety**

### **L.1. Update on activities**

116. Safety Requirements No. TS-R-1, *Regulations for the Safe Transport of Radioactive Material* (Transport Regulations), is subject to regular review. In May 2009, the new 2009 Edition was issued, and already in February 2009 a technical meeting had established working material for the current review, incorporating proposals on several significant issues, including draft text on fissile-excepted material requirements for the transport of radioactive materials. This proposal will simplify the approach to criticality safety during the transport of radioactive material. This will be considered in the upcoming review, along with the possible re-formatting of the Transport Regulations and a revised means of transitioning from one edition to the next. The subsequent revision will be proposed for publication in four to six years, if it is determined that the strict conditions set in the policy approved by the Board of Governors are met. In order to establish greater regulatory stability, it is expected that, should this major change be accepted on this occasion, future updates to TS-R-1 may be made through minor amendments and revisions for the following 10 to 15 years.

117. In January 2009, Safety Guide No. TS-G-1.4, *The Management System for the Safe Transport of Radioactive Material*, was issued, followed in June 2009 by Safety Guide No. TS-G-1.5, *Compliance Assurance for the Safe Transport of Radioactive Material*. In July 2009, a related technical meeting was held to finalize the training package on compliance assurance in transport — the final action in the transport action plan to be completed.

118. In February 2009, a technical meeting reviewed Safety Guide No. TS-G-1.2, *Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material*, and concluded that work should start on its revision, possibly in a modular format.

119. A successful meeting of relevant shipping States and coastal States, with Agency involvement, took place in October 2008 in order to improve mutual understanding, confidence building and enhanced communication in relation to the safe maritime transport of radioactive materials. This continues to be an important channel for sharing concerns regarding the adequacy and application of safety standards in this area.

120. In March 2009, past Transport Safety Appraisal Service (TranSAS) reports were analysed with a view to promoting the good practices identified in them and determining how they could be further adapted to meet Member State needs. In July 2009, the Transport Safety Standards Committee (TRANSSC) supported smaller, shorter missions. Investigations into the synergies that might be obtained by integrating aspects of TranSAS missions with transport audits of the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) were initiated in February 2009.

121. In October 2008, TRANSSC offered advice on the whole range of work carried out by the Agency in the transport safety area, and as a result a significant change in the approach to databases is being developed. The recording of incident data via the Events in the Transport of Radioactive Material (EVTRAM) database is no longer performed, and the Nuclear Event Web-based System (NEWS) is now the single transport incident reporting system. The recommendation from TRANSSC also led to the development of working material to be used in audience specific training which is designed to be easy to translate. In order to assure that the work carried out by the Agency in the transport area fulfils Member State needs, the work will be kept under regular review. The development of networks of transport regulators currently taking place assists in the collation of Member State views.

122. Nuclear Security Series No. 9, *Security in the Transport of Radioactive Material*, has also recently been published. Both this publication and the 2009 Edition of the Transport Regulations have been provided to the Economic Commission for Europe (UNECE), which is expected to incorporate both of them into its Model Regulations which deals with the safety and security of all dangerous goods in transport. A conference on safety and security in transport is planned for 2011 when this revised version of the Model Regulations is expected to be published. It will also mark 50 years since the publication of the first Agency Transport Regulations.

## **L.2. Update on denials of shipment activities**

123. The International Steering Committee on Denials of Shipment of Radioactive Material met in January 2009 in conjunction with five regional coordination meetings representing the networks established at the workshops in China, Italy, Madagascar, United Republic of Tanzania and Uruguay. The action plans of the steering committee and the regional networks have been integrated into a single action plan. One major advance is the improved use of the database on denials, which has resulted in specific cases of denials being resolved. Plans are in place to update the website on denials, including some targeted training material, and the development of an international communication strategy.

## **L.3. Inter-agency meeting**

124. An inter-agency meeting was convened in February 2009 between the ICAO, IMO and the Agency. Other bodies with common interests, such as the International Air Transport Association (IATA), were also involved. This meeting helped establish the relative importance of different work

areas to different agencies and resulted in a coordinated plan of work regarding preparation of standards, Member State audits/appraisals and scheduling of related meetings to minimize travel. The use of inter-agency coordination meetings is an important tool in preventing duplication of work.

## **M. The safety of radioactive waste management**

### **M.1. Outcomes of 3<sup>rd</sup> Review Meeting of the Joint Convention**

125. The Agency supported the Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management for their Organizational Meeting in October 2008 and the 3<sup>rd</sup> Review Meeting in May 2009.

126. Leading up to the 3<sup>rd</sup> Review Meeting, the review process was managed through a secure website for the Joint Convention, first used for the 2<sup>nd</sup> Review Meeting in 2006. The website is now a well established tool for communication in the peer review process, with nearly 3600 questions and answers provided electronically.

127. Forty-five Contracting Parties participated in the 3<sup>rd</sup> Review Meeting, including five new Contracting Parties<sup>4</sup>. With more than 500 registered delegates, there was active and fruitful participation within Country Groups. Throughout the Review Meeting it was observed that the review process is maturing well and more constructive exchanges and more knowledge sharing took place compared to previous Review Meetings. Within Country Group sessions, many Contracting Parties reported on their use of the Agency's safety standards and on their experiences with the IRRS; other Contracting Parties noted that they either plan to undergo or request IRRS missions. All Contracting Parties were encouraged to invite such missions.

128. Issues highlighted in the Summary Report of the Review Meeting included, inter alia, emphasized policy and technical highlights on legislative and regulatory framework, disposal of waste, decommissioning, disused sealed sources, past practices, knowledge management, stakeholder involvement and international cooperation. The participants in the 3<sup>rd</sup> Review Meeting noted the moderate increase in the number of Contracting Parties since the previous Review Meeting. The Contracting Parties suggested that efforts should be stepped up to further increase the number of Contracting Parties and agreed that during the period between Review Meetings, the General Committee of the Joint Convention could encourage the Agency to organize meetings open to all Member States to address specific topics identified during Review Meetings.

### **M.2. Management of spent fuel**

129. A draft Safety Guide on the storage of spent nuclear fuel has been reviewed by Member States and the comments received have been incorporated into the Guide which will be forwarded to the safety standards committees and Commission on Safety Standards for approval. In view of the delays experienced in a number of Member States in the development of disposal facilities for high level waste, storage arrangements for extended periods of time are necessary and it is recognized that international consensus on the standards to be applied to this extended storage is important.

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<sup>4</sup> China, Nigeria, Senegal, South Africa, and Tajikistan

130. As storage times are extended, it is important to understand the behaviour of both the fuel and the storage facilities. The Agency's SPAR-II project, involving many of the world's storage facilities, is providing important information in this regard. Another important consideration is maintaining the validity of transport certification of dual use casks<sup>5</sup> when storage periods in the order of several decades are envisaged and where intrusive inspection is not desirable. The approach proposed is the use of a single safety case and supporting safety assessment to demonstrate both the safety of storage and assurance that the cask will meet conditions of certification for subsequent transport.

131. These and other issues will be considered at the Agency's International Conference on Management of Spent Fuel from Nuclear Power Reactors to be held in 2010.

### **M.3. Networks for radioactive waste management**

132. To promote access to and participation in the development and application of radioactive waste safety and waste management information, the Agency has organized networks that facilitate the harmonization and benchmarking of efforts between Member States. In practice, networks are well-suited to address a broad range of issues where the level of knowledge varies greatly between Member States, but where developing Member States also have much to offer in terms of practical experience and feedback from their efforts. Networks range from the practical hands on approaches to the coordination of efforts addressing important long-term issues such as harmonizing safety assessment methodologies. The successful history of the Network of Centres of Excellence on Training and Demonstration in Underground Research Facilities has led to the creation in 2009 of the International Low-Level Waste Disposal Network (DISPONET).

### **M.4. Disposal of intermediate level waste**

133. The Agency organized an international workshop on disposal of intermediate level radioactive waste in Gyeongju City, Republic of Korea, in December 2008. The workshop covered disposal of a broad range of wastes termed intermediate level waste (ILW). ILW comes from NPP operations and decommissioning, the operation and decommissioning of spent fuel reprocessing facilities and from a number of other diverse origins such as radium wastes and disused sealed radioactive sources. Until recently, low level wastes and high level wastes have received the most attention. ILW includes a broad range of materials and although disposal options have been considered at a national level in a number of Member States, little international activity has taken place. Most Member States with nuclear power programmes have included an ILW disposal facility as one element of their national policy and strategy for radioactive waste management and some currently have operating facilities for ILW disposal.

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

### **N.1. Iraq project**

134. The year 2009 has been an important year for the Agency/Iraq project on decommissioning former nuclear facilities in Iraq. Significant progress has been made, and the first practical

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<sup>5</sup> Casks used for both storage and transport of spent fuel.

decommissioning completed. Although the legislation has not yet been enacted, one of the Iraqi regulators (the Ministry of Environment) was commissioned by the Government to oversee the projects carried out by Ministry of Science and Technology using previously drafted regulations.

135. The first project was to clear 65 000 square metres of the Al Tuwaitha site near Baghdad, specifically that around the LAMA facility where 500 tonnes of radioactively contaminated scrap metal and rubble had been dumped from various locations in Iraq. This work, the first of four stages in the LAMA programme, was necessary to enable access for demolition teams and was completed on time and in budget. The second project prioritized in the programme, decommissioning the former 'GeoPilot' plant used to produce kilogram quantities of hydrated yellowcake, is progressing well. Both projects have provided valuable learning experiences and have validated the decision to prioritize the more lightly contaminated facilities for early decommissioning.

## **N.2. UN Action Plan on Chernobyl to 2016 and ICRIN inter-agencies project**

136. The UN General Assembly, in resolution A/RES/62/9 of December 2007, had inter alia noted with satisfaction the assistance rendered by the Agency to Belarus, Russian Federation and Ukraine on remediation, countermeasures and the monitoring of human exposure in areas affected by the Chernobyl disaster, and requested the preparation of a UN Action Plan on Chernobyl to 2016. One of the important components of this Action Plan is the inter-agency \$2.5 million International Chernobyl Research and Information Network (ICRIN) designed to meet the priority information needs of affected communities. Funded by the United Nations Trust Fund for Human Security, this three-year initiative aims to translate the latest scientific information on the consequences of the accident into sound practical advice for residents of the affected territories. The project was launched as a joint effort of the United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), World Health Organization (WHO) and the Agency in New York in April 2009.

137. The other part of the Agency's contribution to the UN Action Plan includes the continuous support to Ukraine in planning the decommissioning of the Chernobyl NPP and the subsequent spent fuel and radioactive waste management within the Chernobyl exclusion zone. It also includes the support to the three affected countries, Belarus, Russian Federation and Ukraine in developing strategies to remediate remaining contaminated territories.

## **N.3. International Decommissioning Network**

138. The International Decommissioning Network (IDN), launched in late 2007, has continued to mature and expand. IDN now includes over 70 organizations and more than 300 professionals active in decommissioning. The response from countries with developed decommissioning programmes has been particularly heartening. In 2008, workshops in Belgium and Spain featuring hands-on opportunities for participants were very well received. The further activities offered have permitted a comprehensive three-year programme of workshops and training courses. Future efforts are aimed at facilitating direct collaboration between IDN participants to strengthen 'self-help' and participant-ownership features of IDN.

## **N.4. International peer review of the Bradwell decommissioning project**

139. The peer review in July 2008 for the Bradwell Magnox NPP in the United Kingdom covered the decommissioning policy and strategy, the decommissioning plan and the implementation of the decommissioning activities. It focused on five major areas: decommissioning strategy, radiological characterization; decommissioning approach, technologies and techniques, materials management during decommissioning; and surveillance and maintenance. The peer review highlighted the

competence and the professionalism of the staff, but also the difficulties experienced due to ongoing changes in policy, strategy and boundary conditions. As this was the first decommissioning peer review, the experiences and lessons learned were discussed at a Technical Meeting in November 2008, which was open to experts from the whole international decommissioning community. It was concluded that the peer review mechanism, taking into account both safety and technical aspects, could be very useful for many decommissioning projects.

## **N.5. Decommissioning cost estimates**

140. The costs of decommissioning a nuclear facility (reactor, fuel cycle facility, laboratory, etc) could be substantial. It is therefore important to ensure that adequate funding is set aside during the operation of the facility, which requires appropriate methods for estimating the costs involved. The Agency, in cooperation with the EC and OECD/NEA, is preparing an update on a decommissioning costs structure and developing a calculation template. These will be validated using a number of completed research reactor decommissioning projects.

## **O. Remediation and rehabilitation of contaminated sites**

141. The need for the remediation of legacy sites resulting from nuclear weapons testing, nuclear accidents, poor operational practices and abandoned facilities became evident in the late 1980s. Since then, the full extent of the global remediation problem has become clear. In response, the Agency organized several radiological assessments of major affected sites around the world and held a number of international conferences, the last one in May 2009 in Astana, Kazakhstan. The current emphasis is on the remediation of uranium mining and milling legacy sites, in particular in the countries of Central Asia. Many of the old uranium mines were developed with no attention given to the residues left behind or the damage inflicted on the environment.

142. The Conference in Astana recommended that the Agency explore the possibility of negotiating ‘memoranda of common understanding(s)’ among Member States or another equivalent legal framework, with the aim of ensuring that common and coherent radiation protection criteria be used for the remediation of land with radioactive residues. These should take into account that national and site-specific criteria may differ.

143. In the context of regulations, the Conference proposed an International Working Forum for Regulatory Supervision of Legacy Sites, coordinated by the Agency, where regulatory bodies could exchange experiences and knowledge in procedures and regulatory supervision. Draft terms of reference for the forum were presented at the Conference.

144. The involvement in the Conference of many international organizations is a reflection of the importance of this issue. The European Bank for Reconstruction and Development, EC, North Atlantic Treaty Organization, Organization for Security and Co-operation in Europe, United Nations Development Programme, World Bank, World Health Organization, and the Agency were all represented and made presentations. The aims of most of these organizations are similar in that they wish to provide assistance in the remediation of uranium mining and milling legacy sites in the countries of Central Asia. All support a regional approach and see the need for a well defined roadmap before proceeding with any project. The conference has shown more clearly that there is a need for increased coordination between them. The Agency has formal international responsibilities and specialized knowledge in the areas of radiation protection and radioactive waste management and therefore would be the appropriate organization to coordinate this regional approach.

145. The Conference in Astana also supported the strategy of avoiding the creation of future legacy sites by proper planning and good operating practices and by promoting an environmental protection culture among mining companies. The Conference thus gave strong support to ENVIRONET, a new Agency initiative that has the aim of promoting mutual interests and the sharing of information in the area of environmental remediation.

146. On 29 June 2009, the High Level International Forum<sup>6</sup> on Uranium Tailings in Central Asia came to a mutual understanding on the necessity to undertake joint actions to resolve problems of radioactive and toxic waste and inter alia highlighted the importance of preventative measures and other interventions towards implementation of full remediation of contaminated areas. The Forum also urged the international community to continue to support the countries of Central Asia in addressing problems of uranium tailings sites.

## **P. Safety in uranium mining and processing**

147. There has been a significant increase in interest for uranium exploration and production over the past few years. Much of these activities take place in countries already operating uranium mines and mills, but it also affects many countries with limited or no experience in uranium mining. The Agency has thus received an increasing number of requests from such countries for assistance to better appreciate the legal, technical and safety implications of uranium mining, including environmental consequences as well as radiological issues for staff. The challenge for the international community will be to ensure safe and efficient operations and to avoid the creation of new legacy sites. Good practices and stewardship principles needs to be shared throughout the global uranium production industry. The Uranium Production Site Appraisal Team (UPSAT) review services have also been revived, which will provide advice to Member States on best practices. A first UPSAT mission has been requested by Brazil.

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<sup>6</sup> The Forum includes representatives from Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, UN system Agencies and the Eurasian Economic Community.