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Progress in the Implementation of the IAEA Action Plan on Nuclear Safety

Report by the Director General

Summary

1. The IAEA Action Plan on Nuclear Safety, adopted by the Board of Governors in September 2011 and endorsed by all Member States at the 55th session of the General Conference in September 2011, requests the Director General to report on the progress of its implementation to the Board of Governors and General Conference in 2012, and subsequently on an annual basis as may be necessary. This progress report is in response to that request.

2. The main progress can be summarized as follows:

- Since the adoption of the IAEA Action Plan on Nuclear Safety significant progress has been made in several key areas, such as assessments of safety vulnerabilities of nuclear power plants (NPPs), strengthening of the Agency's peer review services, improvements in emergency preparedness and response capabilities, strengthening and maintaining capacity building, and widening the scope and enhancing communication and information sharing with Member States, international organizations and the public. These have contributed to the enhancement of the global nuclear safety framework.
- Significant progress has also been made in reviewing the Agency's safety standards, which continue to be widely applied by regulators, operators and the nuclear industry in general, with increased attention and focus on vitally important areas such as accident prevention, in particular severe accidents, and emergency preparedness and response.
- While the Secretariat and Member States have made progress to improve public information and enhance transparency and communication during emergency situations, continued efforts need to be made to ensure more effective communication to the public and all stakeholders in the event of a radiological or nuclear emergency.

3. Important activities are being and will be carried out in the future in all areas under the Action Plan. Their full and effective implementation requires joint efforts and full commitment from the Secretariat, Member States and other stakeholders.

Progress in the Implementation of the IAEA Action Plan on Nuclear Safety

Report by the Director General

A. Introduction

1. The draft IAEA Action Plan on Nuclear Safety was adopted by the Board of Governors in September 2011 and was endorsed by all Member States at the 55th session of the General Conference in 2011 after the accident at TEPCO's Fukushima Daiichi nuclear power station (the Fukushima accident). The purpose of the Action Plan is to define a programme of work to strengthen the global nuclear safety framework. The Action Plan covers 12 overarching areas. The success of its implementation requires the full cooperation and commitment of Member States, the Secretariat and other relevant stakeholders. The Action Plan requests the Director General to report on the progress of its implementation to the Board of Governors and General Conference in 2012, and subsequently on an annual basis as may be necessary. This report is in response to that request and includes a preliminary assessment of what has been achieved and of areas where further work is needed to implement the goals of the Action Plan.

2. The Director General announced in September 2011 the creation of a Nuclear Safety Action Team to ensure proper coordination among all stakeholders and to oversee the implementation of the Action Plan. Since the 2011 General Conference, the Secretariat has submitted reports on progress in the implementation of the Action Plan to the Board of Governors' meetings held in November 2011 and in March, June and September 2012. The Secretariat has developed a dedicated Nuclear Safety Action Plan web page[1] through which it reports periodically the status of implementation of the actions and their associated activities.

3. Some activities have already been completed; others are continuing to be undertaken in each area. This report highlights key areas of progress since the adoption of the Action Plan while not diminishing the importance of other areas where activities and further work are also in progress within the Secretariat and in Member States. The key areas highlighted in this report are:

- Safety assessment of NPPs;
- Agency peer reviews;
- Emergency preparedness and response;
- Member States planning to embark on a nuclear power programme and capacity building; and
- Communication and information dissemination.

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[1] http://www.iaea.org/newscenter/focus/actionplan/

4. A summary of other key areas is provided below following the summaries of these five areas. Supplementary information on progress on the implementation of the IAEA Action Plan on Nuclear Safety in each area can also be found on the GovAtom website.

B. Safety Assessment of Nuclear Power Plants

5. The Secretariat has been developing activities with a more comprehensive approach for the assessment of safety vulnerabilities of NPPs, for example the methodology developed by the Secretariat for a systematic analysis of the impact of extreme natural hazards on the basis of the Agency's safety standards. This methodology allows Member States to consider options for the enhancement of plant safety and it provides practical methods to assess whether the structures, systems and components and operator actions fulfil the vital safety functions.

6. The Secretariat conducted an international expert mission to Japan in January 2012 with the aim of reviewing, using this methodology, the approach of the Japanese Nuclear and Industrial Safety Agency (NISA) to the comprehensive assessments for the safety of existing power reactor facilities. It focused on external hazards, evaluation of safety margins, plant vulnerabilities, severe accident management and the regulatory activities carried out.

7. National reviews were conducted in several Member States to assess how nuclear installations could withstand the consequences of various extreme events comprising: earthquakes, tsunamis, flooding and other extreme weather conditions; loss of electrical power and loss of ultimate heat sink. The relevant lessons learned about the prevention of severe accidents are being applied by Member States. Member States developed severe accident management strategies that included, inter alia, providing prepositioned equipment and the procedures to use them in the event of a beyond design basis accident. The Secretariat is aware of the results of some of these reviews; however, more information and further details would be needed in order to be able to identify and to disseminate a comprehensive set of lessons and corrective measures for the benefit of all Member States.

8. Concerted efforts need to be made to establish a robust capacity to protect against beyond design basis accidents, by ensuring that the safety assessment identifies all the potential weaknesses and possible cliff edge effects that could lead to an initiating event.

9. The international experts' meeting (IEM) on reactor and spent fuel safety held in March 2012 provided an important opportunity for Member States to share their experiences from these assessments, to discuss and share lessons learned and to disseminate this information. A consolidated report of this meeting is being finalized and will be published in the near future.

10. National regulatory authorities and operators should give priority to severe accident analysis and the ability to mitigate the consequences of a severe accident. In this regard, during the Agency's peer reviews the Secretariat is putting emphasis on reviewing severe accident management strategies, including prevention, mitigation and implementation strategies for operators and regulators.

11. In the light of recent lessons, the impact of human factors and organizational factors on safety need to be considered in a more comprehensive manner when undertaking safety assessments of NPPs.

12. The Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety in August 2012 will provide an additional opportunity to consider and discuss the implementation of further measures to strengthen nuclear safety worldwide.

C. Agency Peer Reviews

13. Agency peer reviews are an essential safety tool as they provide an assessment of, and an incentive for, the implementation of the Agency's safety standards in Member States. Several activities have been conducted with the aim of analysing and strengthening peer review services in the areas of the regulatory framework, operational safety, emergency preparedness and response, design safety and site evaluation.

14. Enhancements were introduced in a number of areas by incorporating lessons learned to date from the Fukushima accident mainly in terms of adding new modules to reflect these lessons in Integrated Regulatory Review Service (IRRS) and Emergency Preparedness Review (EPREV) service peer reviews. For Operational Safety Review Team (OSART) service peer reviews, severe accident management has been included in a separate core module. For the Design Safety Review Service (DSRS), new guidelines were developed for the review of accident management in the safety assessment area. DSRS reviews have also been restructured to combine peer review services in the design area in a modular approach in which the safety of the design is considered at different phases. The Site and External Events Design (SEED) review service has now replaced the Site Safety Review Service, incorporating improvements to better address the needs of Member States in the areas of site selection, hazard assessment and the design of structures, systems and components.

15. The effectiveness of several peer reviews is being enhanced by sharing results, experiences and lessons learned with Member States. Further enhancements in the planning and implementation of the peer review services are being considered for the longer term in close cooperation with Member States.

16. In order to improve transparency, several reports on the results of peer reviews carried out in the past ten years have been shared by making them available on the Agency's website with the consent of Member States.

17. There has been an increase in demand for Agency peer review services over previous years; however, in many relevant safety areas peer reviews are yet to be requested as called for by the Action Plan. In order to meet the increased demand for peer reviews, additional experts from Member States will be necessary to effectively carry out these important missions.

18. Strengthening the concept of national self-assessment in all relevant safety areas prior to peer reviews and a more consistent approach among peer review services would be needed.

19. Follow-up missions are essential to make an assessment of the implementation of the findings of peer review missions as well as to identify new challenges. Some practical implementation of peer review findings need attention from the governmental representatives of the Member State in order to obtain the necessary support and resources for improving safety at the national level.

20. The implementation of the recommendations from an Agency peer review that includes lessons learned from the Fukushima accident would contribute to enhancing the effectiveness of both the regulatory framework and the operating organizations in Member States.

D. Emergency Preparedness and Response

21. Important steps have been taken in the area of emergency preparedness and response, namely to enhance the Agency's preparedness capabilities, emergency communications, international assistance and inter-agency response coordination, and peer reviews of national preparedness.

22. Improvements of the Agency's Response and Assistance Network (RANET) were identified to broaden the assistance capabilities and expand the functional areas, in particular the assessment and advice to competent authorities for on-site mitigation activities and for ensuring and maintaining rapid response capabilities under RANET. Improvements include new guidance, roles and responsibilities and actions needed on the part of Member States to prepare for, to request and to receive emergency assistance. In this regard, a programme has been initiated for the preparation of RANET review missions. It is necessary that more Member States register their national assistance capabilities under RANET and to develop procedures on the application of the new RANET capabilities taking into account on-site mitigation needs during a nuclear emergency.

23. Further enhancements have been carried out in the Agency's Incident and Emergency System. One of them is the upgraded Response Plan for Incidents and Emergencies (REPLIE) and its procedures to provide Member States, international organizations and the general public with timely, clear, factually correct, impartial and easily understandable information during a nuclear emergency. The Agency's capabilities for performing technical assessments of the potential consequences of an emergency and the accident progression have also been reviewed and areas for improvement have been identified. In line with the strategy recommended in the final report of the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies, the Emergency Preparedness and Response Expert Group (EPREG) is being established to advise the Secretariat on strategy and steps for strengthening and sustaining international preparedness. Member States' involvement in further strengthening international emergency preparedness will be intensified through EPREG.

24. The Secretariat actively participated in and contributed to the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) meeting in December 2011, which considered proposals to strengthen the international emergency preparedness and response framework. Taking into account the lessons learned from the Fukushima accident, further improvements were identified as needed in the areas of communication among organizations, communication with the public and specific technical communities, and emergency preparedness in general. A revision of the Joint Radiation Emergency Management Plan of the International Organizations (JPLAN) was initiated to incorporate these lessons. The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) became the sixteenth member of IACRNE and a co-sponsor of the JPLAN, thus broadening international cooperation in emergency preparedness and response.

25. Interest from Member States in reviewing and carrying out self-assessments of their national emergency preparedness and response systems is increasing. The EPREV peer review service is an essential tool to assist in strengthening national emergency preparedness and response. In addition, national, regional and interregional training events were organized in different areas of emergency preparedness and response.

26. With a view to effectively addressing the need for improved and enhanced public information, the Secretariat has been reviewing its activities and will do more to further develop its strategy for more effective communication to the public and all stakeholders in the event of a radiological or nuclear emergency (see also "Communication and Information Dissemination" below).

27. The Secretariat has enhanced its readiness to conduct, with the consent of the State concerned, timely fact-finding missions in the event of a nuclear emergency and to make the results publicly available.

28. The Secretariat has launched implementing measures to strengthen the Agency's capabilities for assessment and prognosis, in particular to utilize available tools in Member States. Testing the capabilities and arrangements (REPLIE, IEComm[2], RANET, JPLAN and protocols), including assessment of potential radiological consequences and prognosis of emergency progression and the use of more effective public communication, is essential to ensure that all tools and mechanisms are practically in place and ready to respond to any emergency. Such testing will be carried out during the next full scale ConvEx-3 exercise scheduled for 2013.

E. Member States Planning to Embark on a Nuclear Power Programme, and Capacity Building

29. Launching a nuclear power programme is a major national undertaking that requires careful planning, preparation and investment in time and resources. The Secretariat established programmes to facilitate and assist in the development of the infrastructure necessary for Member States embarking on a nuclear power programme as well as to continue to update the modular packages developed for the assistance in the establishment of nuclear infrastructure.

30. Lessons learned from the Fukushima accident applicable to the development of a new infrastructure are being incorporated into the Agency’s guidance, such as: *Evaluation of the Status of National Nuclear Infrastructure Development* (IAEA Nuclear Energy Series No. NG-T-3.2), *Milestones in the Development of a National Infrastructure for Nuclear Power* (IAEA Nuclear Energy Series No. NG-G-3.1) and *National Position for a Nuclear Power Programme*. In addition, a new Safety Guide, *Establishing the Safety Infrastructure for a Nuclear Power Programme* (IAEA Safety Standards Series No. SSG-16), was published. They are useful tools for applying the Agency’s guides and standards in the development of nuclear infrastructure.

31. The Fukushima accident reinforced the need to develop, strengthen, maintain and implement capacity building programmes in Member States with nuclear power programmes and in those planning to embark on such programmes. In this context, it is necessary that Member States perform self-assessments for strengthening and maintaining capacity building. The Secretariat has developed relevant guidance, including a self-assessment methodology for capacity building activities covering education and training, human resource development and knowledge management in cooperation with Member States. It is necessary that Member States perform self-assessments of their national infrastructure and develop national plans, and that the Secretariat assists in their development and implementation addressing the needs identified in their self-assessment.

32. In addition, an Education and Training Review Service (ETReS) was established to assist Member States to develop and to maintain a sustainable and adequate education and training programme in nuclear safety consistent with the Agency’s safety standards and international good practices.

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[2] Manual for Official Communication in Incidents and Emergencies

33. The Integrated Nuclear Infrastructure Review (INIR) missions, which apply the Agency's safety standards and guidance, provide an evaluation of the overall status of a national nuclear infrastructure. The updated INIR guidelines incorporate lessons from previous missions as well as lessons learned from the Fukushima accident, thus enhancing their effectiveness. Member States embarking on a nuclear power programme may find it useful for INIR missions and relevant safety review missions to be carried out and their recommendations implemented prior to commissioning a first nuclear power plant.

34. Similarly, Member States embarking on nuclear power programmes would benefit from participating in the Regulatory Cooperation Forum which was created to help government officials in the development of an effectively independent and robust regulatory body for nuclear power and for overall safety infrastructure.

F. Communication and Information Dissemination

35. Enhancing communication with the public in a nuclear or radiological emergency is essential for transparency and gaining public trust as well as to help take effective protective measures during an emergency. In the case of the Fukushima accident, the Agency served as an essential point of reference while distributing, in line with its mandate, to all Member States official information validated by Japan.

36. The Action Plan called for a broader Agency role in response to nuclear incidents and emergencies, with a widening of the scope of information and assessments shared with Member States, international organizations and the public. In this context, the Secretariat has reviewed its capabilities for performing technical assessments in the event of a nuclear emergency to provide timely, clear, factually correct, impartial and understandable information. To meet expectations in this regard, it is vitally important for the Secretariat to receive information on an incident regarding the accident progression and the source term, as well as radiological data.

37. The Secretariat developed the Manual for Official Communication in Incidents and Emergencies (IEComm) which will help facilitate and improve the practical implementation of the Early Notification and Assistance Conventions. Its application will improve the information exchange on nuclear and radiological incidents and emergencies between the Secretariat, States and relevant international organizations. The Secretariat will continue publishing relevant manuals such as IEComm to improve communication among Member States, the Secretariat, the public and other relevant stakeholders during emergencies.

38. In addition, a protected web based Unified System for Information Exchange in Incidents and Emergencies (USIE) became operational. In order to improve the information exchange, it would be necessary for Member States to join the USIE as well as make several functional improvements in USIE, including to the International Radiation Information Exchange (IRIX) standards. The Secretariat published a document and associated training materials in its Emergency Preparedness and Response Series entitled *Communication with the Public in a Nuclear or Radiological Emergency* that provides practical guidance to those responsible for informing the public and media.

39. The Secretariat issued practical guidance for those responsible for informing the public and the news media and for coordinating all sources of official information to ensure that a consistent message is provided to the public before, during and after a nuclear or radiological emergency.

40. It is essential to analyse all the relevant technical aspects and to share information and best practices among Member States, the Secretariat and other interested parties in the light of the Fukushima accident. In this regard, international experts' meetings (IEMs) have proven to be an effective vehicle to share experiences and results among Member States on significant technical topics.

41. The IEMs organized in 2012 by the Secretariat addressed topics such as reactor and spent fuel safety in the light of the Fukushima accident, enhancing transparency and effectiveness of communication in the event of a nuclear or radiological emergency, and protection against extreme earthquakes and tsunamis in the light of the Fukushima accident.

42. All IEMs analysed at expert level the relevant technical aspects, drew lessons from the Fukushima accident, and their conclusions were disseminated to Member States and the public through the Agency's website. The Secretariat will prepare reports containing all information shared and the lessons learned, including the Secretariat perspectives and views, for each IEM, which will be made available to Member States. Several other important topics are being considered to be addressed in other IEMs planned for 2013 and 2014.

43. The application of the International Nuclear and Radiological Event Scale (INES) did not prove to be very effective as a communication tool during the Fukushima accident. Multiple-unit sites affected by severe hazards, as in the case of this accident, are not covered in the INES manual. Review of the application of the scale with regard to severe, complex and evolving events is under way.

44. The Secretariat will continue to promote and conduct regular emergency response exercises with the participation of national authorities and international organizations and include communication with the media.

G. Other Areas

45. The Secretariat established an internal Safety Standards Review Task Force to review relevant Agency safety standards in the light of the Fukushima accident. The Commission on Safety Standards (CSS) welcomed the approach proposed by the task force, with priority given to the review of the Safety Requirements applicable to NPPs and to the storage of spent fuel. In March 2012, the CSS considered the Secretariat's task force progress report on the review of the Agency's safety standards in the light of the lessons learned from the Fukushima accident to date. The report identified areas where the Safety Requirements could be further strengthened. The CSS also supported the Secretariat's proposal to incorporate these improvements as addenda to each individual publication and to review and approve all of them in one document prepared by the Secretariat to improve the efficiency of the review and approval process. Based on the Secretariat's proposals, the CSS prepared its progress report, which was provided to the Director General in May 2012. Proposals for detailed improvements to these Safety Requirements are being prepared by the Secretariat and will be submitted to the Safety Standards Committees for review at their forthcoming meetings in 2012, before consultations with Member States.

46. In the area of the international legal framework, the Secretariat has been providing support to the Contracting Parties in their efforts to enhance the effective implementation of the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency through

meetings, outreach activities, training courses and missions. The Secretariat continued to provide assistance and support to Member States and the International Expert Group on Nuclear Liability (INLEX) with regard to establishing a global nuclear liability regime. In particular, INLEX, at the annual meeting held in May 2012, agreed on a set of specific recommendations[3] to facilitate the achievement of a global nuclear liability regime, as requested by the Action Plan.

47. In the area of protection of people and the environment, the Secretariat provided assistance and support to Japan on the remediation of the large areas of land contaminated as a result of the Fukushima accident. The Secretariat has also established an international programme on models and data for radiological impact assessment to compare methodologies for the assessment of public exposures and radiological impacts for a wide range of exposure situations including the experiences from the Fukushima accident. It is also deemed important to support Member States in developing their competence in the characterization and remediation of sites affected by nuclear and radiological accidents. Moreover, it has been decided to review and update the current strategies for monitoring the environment, food and people to facilitate dose assessment and decision-making on countermeasures and remediation and produce a technical report to be made available to Member States.

48. A prioritization effort was conducted within activities already established in the Agency's programmes to facilitate an effective and immediate implementation of the Action Plan, with due regard to maintaining the balance among major programmes and the overall size of the Regular Budget.

49. The Action Plan expenditures derive from newly created activities implemented up to July 2012, as well as by regular and extrabudgetary activities planned for the 2012 budget. Dedicated 'Action Plan projects' have been established for 2013 considering new and existing activities related to the Action Plan; this was not carried out for 2012 as the budget was approved prior to the adoption of the Action Plan.

H. Conclusions

50. Since the adoption of the IAEA Action Plan on Nuclear Safety significant progress has been made in several key areas, such as, assessments of safety vulnerabilities of NPPs, strengthening of the Agency's peer review services, improvements in emergency preparedness and response capabilities, strengthening and maintaining capacity building, and widening the scope and enhancing communication and information sharing with Member States, international organizations and the public, that have contributed to the enhancement of the nuclear safety framework.

51. Significant progress has also been made in reviewing the Agency's safety standards, which continue to be widely applied by regulators, operators and the nuclear industry in general, with increased attention and focus on vitally important areas such as accident prevention, in particular severe accidents, and emergency preparedness and response.

52. While the Secretariat and Member States have made progress to improve public information and enhance transparency and communication during emergency situations, continued efforts need to be made to ensure more effective communication to the public and all stakeholders in the event of a radiological or nuclear emergency.

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[3] http://ola.iaea.org/OLA/documents/ActionPlan.pdf

53. Important activities are being and will be carried out in the future in all areas under the Action Plan. Their full and effective implementation requires joint efforts and full commitment from the Secretariat, Member States and other stakeholders.