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

Report by the Director General

Summary

The IAEA Action Plan on Nuclear Safety (the Action Plan), adopted by the Board of Governors in September 2011 and endorsed by all Member States at the 55th regular session of the Agency's General Conference in September 2011, requests the Director General to report on the progress in its implementation to the Board of Governors and General Conference in September 2012, and subsequently on an annual basis, as may be necessary. Annual reports by the Director General on the progress in the implementation of the Action Plan were submitted to the Board of Governors and General Conference in September 2012[1], 2013[2] and 2014[3]. This is the fourth and final annual progress report in response to that request.

This report focuses on the key areas of progress in the implementation of the Action Plan since the submission of the previous annual report to the Board of Governors and General Conference in September 2014. Important activities continue to be carried out in all areas under the Action Plan; in particular during the period of this report, a number of new projects relevant to the Action Plan were initiated.

This report is accompanied by supplementary information[4] that provides further details on progress since the previous annual report. The supplementary information identifies activities that will continue beyond 2015 and that will be transferred to the programmes of the relevant Agency Divisions.

[1] Document GOV/INF/2012/11-GC(56)/INF/5.
[2] Document GOV/INF/2013/8-GC(57)/INF/5.
[3] Document GOV/INF/2014/15-GC(58)/INF/7
[4] *Progress in the Implementation of the IAEA Action Plan on Nuclear Safety: Supplementary Information.*

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

Report by the Director General

A. Introduction

1. Following the accident at TEPCO's Fukushima Daiichi nuclear power plant (the Fukushima Daiichi accident), the draft IAEA Action Plan on Nuclear Safety (the Action Plan) was adopted by the Board of Governors in September 2011 and was unanimously endorsed by Member States at the 55th regular session of the Agency's General Conference in September 2011. 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 in its implementation to the Board of Governors and General Conference in 2012[5], and subsequently on an annual basis as may be necessary.

2. This is the fourth and final annual report by the Director General in response to that request in addition to eight quarterly reports issued during the four years since September 2011. The supplementary information that accompanies this report includes an assessment of achievements since the previous report submitted to the Board of Governors and the General Conference in September 2014[6].

3. During the period covered by this report, ten new projects have been initiated by the Secretariat. These projects address key areas of the Action Plan and were funded from extrabudgetary contributions. Further information on expenditures of the extrabudgetary contributions as well as the Regular Budget is provided in Annex II to the supplementary information to this report.

4. The key areas of the Action Plan highlighted in this report are:

- Safety assessment of nuclear power plants (NPPs);
- Agency peer reviews;

[5] GOV/INF/2012/11–GC(56)/INF/5 (9 August 2012).
[6] GOV/INF/2014/15-GC(58)/INF/7 (22 July 2014)

- Emergency preparedness and response;
- Agency safety standards;
- Member States planning to embark on a nuclear power programme and capacity building; and
- Protection of people and the environment from ionizing radiation.

Supplementary information to this report containing, inter alia, further details on progress made in all the 12 areas of the Action Plan and achievements of the Secretariat in the reporting period can be found on the GovAtom website.

5. The Secretariat continued to share and disseminate the lessons learned from the Fukushima Daiichi accident by analysing the relevant technical aspects. The Secretariat organized and conducted the final two international experts' meetings (IEMs) in 2015, on Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, and Assessment and Prognosis in Response to a Nuclear or Radiological Emergency.

6. The Secretariat completed the systematic review of the Safety Requirements applicable to NPPs, the storage of spent fuel and emergency preparedness and response. Revised Safety Requirements, endorsed by the Commission on Safety Standards (CSS), were submitted to the Board of Governors in March 2015. The Board of Governors approved these revisions to be established as Agency safety standards.

7. Following consultations with Member States and assessing their requests and needs, a new Emergency Preparedness and Response Standards Committee (EPReSC) has been established under the CSS.

8. The Secretariat finalized the report on the Fukushima Daiichi accident for release at the 59th regular session of the General Conference. The report is the result of an extensive international collaborative effort involving five working groups with about 180 experts from 42 Member States, with and without nuclear power programmes, and several international bodies. The Board of Governors took note of the report by the Director General[7] which draws on five detailed technical volumes prepared by international experts and on the contributions of the many experts and international bodies involved.

9. The progress made in the implementation of the Action Plan since the previous annual report has contributed to the enhancement of the global nuclear safety framework and is summarized in the following sections of this report.

10. The 2014 progress report indicated that the outcomes and activities resulting from the Action Plan and the report on the Fukushima Daiichi accident should be integrated into the regular programme of work of the Agency. Accordingly, the supplementary information to the present report outlines the activities that are to be transferred to the regular programme.

[7] GOV/2015/26 (14 May 2015)

B. Safety Assessment in the Light of the Accident at TEPCO's Fukushima Daiichi Nuclear Power Plant

11. The Secretariat continued its activities to support Member States in assessing the safety vulnerabilities of their NPPs. The Secretariat organized and conducted two consultancy meetings in Vienna in September 2014 and March 2015, respectively, to discuss complementary assessment of the robustness of NPPs with a view to improving the assessment of the impact of extreme external events. The application of the methodology for complementary assessment developed by the Secretariat — the Fault Sequence Tool for Extreme Events (FAST-EE) — was discussed and gaps in existing analysis methods were identified. A draft IAEA report, *Overview of the Considerations Pertaining to PSA-Based Methodologies for Complementary Assessment of NPP's Robustness against the Impact of Extreme Events*, was also discussed. The draft report outlines the deliberations required for reliable and effective safety assessments, including consideration of a wide range of possible hazards and their possible combinations and correlations.

12. The participants of both meetings considered that a more comprehensive approach needs to be developed for the complementary assessment of the robustness of NPPs to withstand the impact of extreme events. The fault sequence analysis approach was considered to be a useful tool to combine elements of both probabilistic and deterministic safety assessment methods when considering the impact of external hazards. This approach allows the identification of critical fault sequences that may be caused by external hazards and/or their combinations. The FAST-EE software tool increases the efficiency of safety assessments by specifying any feasible combination of hazards and their magnitudes, as well as the analysis of long duration accident sequences.

13. In December 2014, the Secretariat organized and conducted a consultancy meeting to consider severe accident mitigation through improvements to reliable containment cooling and filtered venting for design basis accidents (DBAs) and beyond design basis accidents (BDBAs). The main objective of the meeting was to plan for a Technical Meeting[8] on this topic and to prepare an outline for an IAEA publication provisionally entitled *Severe Accident Mitigation through Improvements in Filtered Containment Venting for Water Cooled Reactors*. The meeting participants examined the experience gained in the design and testing of containment cooling and containment vent systems along with means of modifying existing NPPs to provide for a filtered discharge from the containment for a DBA or BDBA. The meeting participants also reviewed test programmes used by a number of Member States to validate vent systems and identified approaches to protect the containment under BDBA conditions. In addition, the approach to modelling the behaviour of containment vent systems using probabilistic safety assessments and the impact of such venting on large release frequencies for different NPP designs were considered.

14. In October 2014, the Secretariat and the Concern for Production of Electric and Thermal Energy at Nuclear Power Plants jointly organized in Moscow, Russian Federation, a national workshop to consider the lessons learned from the Kashiwazaki-Kariwa, Fukushima Daiichi, Onagawa and North Anna NPPs. The participants shared information and discussed the lessons learned from the earthquakes and tsunamis that have affected NPPs in Japan and the United States of America. The workshop considered the impact of ground motion on civil structures and equipment, the performance of safety systems and the methodologies and approaches used for seismic hazard assessment. The workshop also covered the assessment of external natural hazards at NPP sites with multiple units.

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[8] Technical Meeting on Severe Accident Mitigation through Improvements in Filtered Containment Venting for Water Cooled Reactors 31 August – 3 September 2015, Vienna, Austria

C. Agency Peer Reviews

15. The Secretariat continued to undertake activities to strengthen its comprehensive peer review services, in particular, the Operational Safety Review Team (OSART) service, the Integrated Regulatory Review Service (IRRS), the Emergency Preparedness Review (EPREV) service and the Design and Safety Assessment Review Service (DSARS). This included:

- A trial application of the new OSART guidelines (a revision of the 2005 edition) during missions conducted in the reporting period;
- Revision of the EPREV guidelines to take account of the lessons learned from past missions and production of a final draft of the guidelines in June 2015 that will be made available to expert reviewers as working material by the end of 2015; and
- Completion of the second Basic IRRS training course in Vienna, Austria, in October 2014.

16. Requests from Member States for Agency peer review services have continued to increase during the reporting period. Since the submission of the annual report in September 2014, the Secretariat conducted:

- 9 IRRS missions to Armenia, Cameroon, Croatia, France, Hungary, India, Malta, the Netherlands, and Zimbabwe;
- 7 follow-up IRRS missions to Finland, the Republic of Korea, Slovakia, Slovenia, Switzerland, the United Arab Emirates and Viet Nam;
- A preparatory IRRS mission to Japan;
- 3 Integrated Nuclear Infrastructure Review (INIR) missions to Jordan (INIR2), Kenya (INIR1) and Nigeria (INIR2);
- A follow-up Integrated Nuclear Infrastructure Review (INIR) mission to Viet Nam;
- 6 OSART missions to France (Flamanville Units 1 and 2), Hungary (Paks), the Netherlands (Borssele), the Russian Federation (Kola), the United States of America (Clinton) and Japan (Kashiwazaki-Kariwa);
- 2 follow-up OSART missions to France (Chooz) and Mexico (Laguna Verde);
- A Corporate OSART mission to France (EdF);
- A follow-up Corporate OSART mission to the Czech Republic (ČEZ);
- A Pre-EPREV mission to Hungary;
- 4 EPREV missions to Ghana, Kenya, Nigeria, and the United Arab Emirates;
- 2 pre-Site and External Events Design (SEED) service missions to the Plurinational State of Bolivia and Viet Nam;
- 4 SEED missions to China, Saudi Arabia, Sudan and Viet Nam;
- A pre-Safety Assessment of Long Term Operation (SALTO) mission to Mexico (Laguna Verde);
- 2 SALTO missions to Belgium (Tihange 1) and the Czech Republic (Dukovany); and

- 2 International Probabilistic Safety Assessment Review Team (IPSART) missions to Armenia (Armenian) and Switzerland (Leibstadt).

D. Emergency Preparedness and Response

17. The Secretariat continued to undertake activities to support Member States' emergency preparedness and response (EPR) arrangements at the interregional, regional and national levels. During the reporting period, the Secretariat organized and conducted a series of training events and workshops on various EPR topics including the assignment of roles and responsibilities and the development of a technical basis for establishing EPR arrangements.

18. The Secretariat continued to encourage Member States to register their assistance capabilities in the Agency's Response and Assistance Network (RANET)[9], particularly in the new functional area entitled "Nuclear Installation Assessment and Advice". New RANET registrations were received from Belgium and the Republic of Korea, while the USA added capabilities in the new functional area. A RANET workshop was conducted in Japan in November 2014 involving nine Member States that have registered radiation survey capabilities as Field Assistance Teams in RANET. The workshop further enhanced the international assistance framework through the exchange of information and experience on radiation survey capabilities and the opportunity to conduct environmental monitoring activities within the restricted area around the Fukushima Daiichi NPP.

19. The Secretariat organized and conducted the ninth in the series of IEMs in April 2015 on Assessment and Prognosis in Response to a Nuclear or Radiological Emergency. The meeting provided an important forum for experts to discuss and share the latest developments in this area. The Secretariat provided an update on the implementation of the assessment and prognosis process being developed in response to the Action Plan. The meeting highlighted the necessity of incorporating the advanced capabilities of Member States into the assessment process and the need to share static and dynamic technical data during the preparedness and response phases of an emergency. The experts discussed the need for harmonization of messages to the public during an incident or emergency and how the Secretariat could support such a process at the international level.

20. The design and testing of the Emergency Preparedness and Response Information Management System (EPRIMS), which allows Member States to complete an EPR self-assessment questionnaire online, were completed during the reporting period. Through EPRIMS, Member States can also provide the Secretariat with technical data concerning their NPP, which will serve as a reliable resource in the assessment and prognosis of a nuclear or radiological emergency.

21. The Secretariat continued work on the organization of an international conference on Global Emergency Preparedness and Response, to be held in Vienna in October 2015. The conference will provide a forum for experts to discuss emergency management, protection strategies, communication, public health and medical response, waste, international cooperation, education and training, and past experiences.

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, IAEA Response and Assistance Network, Emergency Preparedness and Response Series, EPR-RANET 2013, IAEA, Vienna (2013).

E. Agency Safety Standards

22. The Secretariat completed the systematic review of the relevant Safety Requirements to take account of the lessons learned from the Fukushima Daiichi accident. Proposed draft amendments to the Safety Requirements applicable to NPPs and the storage of spent nuclear fuel along with the proposed revision to the Safety Requirements for emergency preparedness and response were endorsed by the CSS and submitted to the Board of Governors. In March 2015, the Board of Governors approved the following six Safety Requirements to be established as Agency safety standards:

- *Governmental, Legal and Regulatory Framework for Safety* (IAEA Safety Standards Series No. GSR Part 1 (Rev. 1));
- *Site Evaluation for Nuclear Installations* (IAEA Safety Standards Series No. NS-R-3 (Rev. 1));
- *Safety of Nuclear Power Plants: Design* (IAEA Safety Standards Series No. SSR-2/1 (Rev. 1));
- *Safety of Nuclear Power Plants: Commissioning and Operation* (IAEA Safety Standards Series No. SSR-2/2 (Rev. 1));
- *Safety Assessment for Facilities and Activities* (IAEA Safety Standards Series No. GSR Part 4 (Rev. 1)); and
- *Preparedness and Response for a Nuclear or Radiological Emergency* (IAEA Safety Standards Series No. GSR Part 7).

23. The review and revision of the relevant Safety Guides are being performed in accordance with a prioritization process established by the Safety Standards Committees and the CSS. This prioritization process takes into account the request sent to the CSS by the Director General as a follow-up to the Vienna Declaration on Nuclear Safety adopted by the Contracting Parties to the Convention on Nuclear Safety (CNS) at the Diplomatic Conference on the CNS held in Vienna, Austria, in February 2015.

24. In June 2015, the Board of Governors[10] was informed of the establishment of the new Emergency Preparedness and Response Standards Committee (EPReSC) under the CSS which will ensure the involvement of a sufficient number of Senior EPR subject matter experts in the process of establishing Agency safety standards.

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

25. The Secretariat continued to support Member States embarking and planning to embark on a nuclear power programme to establish an appropriate national infrastructure, including developing the capabilities of operating organizations, regulatory bodies and other relevant organizations.

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[10] GOV/INF/2015/9 (20 May 2015)

26. The Secretariat published a report entitled *Capacity Building for Nuclear Safety*, which highlights the lessons learned from the Fukushima Daiichi accident that are relevant to the strengthening of capacity building in Member States. The report was based on the insights that resulted from the discussions at the IAEA International Conference on Human Resource Development for Nuclear Power Programmes held in May 2014, experience from the IAEA peer review services, as well as discussions at relevant IEMs. The report addresses the development of national strategies to deal with education and training, human resource development, as well as knowledge management and networks. Addressing these issues is important for ensuring safe, secure and sustainable nuclear power programmes, and requires continuous, dedicated programmes at global, national and organizational levels.

27. The Secretariat organized and conducted two meetings to consider the establishment of a broad European safety network. The initial deliberations on an eastern European safety network were expanded to cover other parts of Europe and the Central Asian region to include the European Union, Switzerland, and Central Asian Member States. Such a network would serve to support capacity building initiatives at a regional level and provide a framework for cooperation by facilitating knowledge exchange and allowing for improved cooperation and coordination with existing safety networks.

28. The Secretariat continued to promote the knowledge safety networks as effective tools for sharing the findings and lessons learned from the peer review services and other relevant activities under the Global Nuclear Safety and Security Network (GNSSN) and other regional networks. The Secretariat organized and conducted a series of regional and national workshops on topics such as leadership and management, regulatory frameworks, and national policy and strategy for safety. In addition, the Basic Professional Training Course on Nuclear Safety and the series of training courses on regulatory control of nuclear power have undergone revision to reflect experience and feedback from previous courses.

29. The Secretariat organized a side event at the 58th regular session of the General Conference in September 2014 to consider Member States' experiences of making the best use of the peer review services to support the development of their national nuclear power infrastructures. Representatives from Kenya, Malaysia and Turkey presented the current status and future plans for their nuclear power programmes and emphasized the importance of building a sustainable nuclear power infrastructure. The Secretariat provided an update on the revision of the *Milestones in the Development of a National Infrastructure for Nuclear Power* (IAEA Nuclear Energy Series NG-G-3.1, Vienna, 2007), which will be published by the end of 2015.

G. Protection of People and the Environment from Ionizing Radiation

30. In September 2014, the Secretariat published the report entitled *Experiences and Lessons Learned Worldwide in the Cleanup and Decommissioning of Nuclear Facilities in the Aftermath of Accidents* (IAEA Nuclear Energy Series No. NW-T-2.7, Vienna, 2014)[11]. This publication reviews Member States' activities in the clean-up and decommissioning of nuclear facilities in the aftermath of accidents and reports on the experiences and lessons learned.

[11] http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1644_web.pdf

31. The Secretariat held the third Technical Meeting on Modelling and Data for Radiological Impact Assessments (MODARIA) in Vienna in November 2014. The programme continued to enhance capabilities in Member States for environmental modelling and assessment of radiation exposures to people and the environment.

32. The Secretariat continued to support the marine monitoring programme conducted by the authorities in Japan to confirm whether the programme is performed in an internationally recognized, transparent and reliable manner. The programme is being evaluated through proficiency tests and interlaboratory comparison exercises conducted in Japan and other countries. The exercises were organized to assess radionuclides in seawater in September and November 2014 and in May 2015. Experts from the Agency's marine environmental laboratories in Monaco participated together with Japanese experts in the routine collection of seawater samples from the sea near the Fukushima Daiichi NPP. Samples were collected and shared among Japanese and Agency participants. Identical samples are measured independently in Japanese and Agency laboratories and the results are compared. The results obtained so far for Cs-134 and Cs-137 measurements from the laboratories participating in the interlaboratory comparison exercise show a high degree of agreement.

33. The International Project on Decommissioning and Remediation of Damaged Nuclear Facilities (the DAROD Project) was launched by the Secretariat in January 2015. The aim of the project is to learn lessons from the decommissioning and remediation of accident-damaged nuclear facilities and to identify gaps and needs for additional guidance to address issues related to strategic planning, as well as technical and regulatory aspects. The scope of the project covers the time between the emergency at a nuclear facility being declared over until completion of decommissioning and remediation. The project will focus on the physical infrastructure and radioactively contaminated areas within a licensed nuclear site boundary.

34. The Secretariat organized and conducted the third international peer review mission on the Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1–4, in February 2015. The review team focussed on the safety and technological aspects of decommissioning, management of radioactive waste, control of underground water and accumulation of contaminated water at the site, and the planning and implementation of pre-decommissioning and decommissioning activities, including removal of spent and damaged fuel. The mission also reviewed progress achieved since two earlier missions (which took place in April 2013 and November–December 2013). The review team considered that Japan has made good progress in improving its strategy and the associated plans, as well as in allocating the necessary resources to the safe decommissioning of TEPCO's Fukushima Daiichi NPP. The review team offered a number of advisory points on areas in which current practices could be improved, taking into account both international standards and the experience of decommissioning programmes in other Member States. The report was presented to the Government of Japan in April 2015 and is available on the Agency's website[12].

H. Other Areas

35. The Secretariat finalized the report on the Fukushima Daiichi accident for release at the 59th regular session of the General Conference. The report is the result of an extensive international collaborative effort involving five working groups with about 180 experts from 42 Member States,

[12] https://www.iaea.org/sites/default/files/missionreport130515.pdf

with and without nuclear power programmes, and several international bodies. The Board of Governors took note of the Report by the Director General[13] which draws on five detailed technical volumes prepared by international experts and on the contributions of the many experts and international bodies involved.

36. The report provides a description of the accident and its causes, evolution and consequences, based on the evaluation of data and information from many sources available up to March 2015, including the results of the work carried out in implementing the Action Plan, and it highlights the main observations and lessons. Significant amounts of data were provided by the Government of Japan and other organizations in Japan.

37. In February 2015, the IAEA, in cooperation with the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, organized and conducted an IEM on Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant. The meeting provided a forum for experts to share information and experience related to completed research and development (R&D) activities and future R&D needs.

38. Experts discussed R&D strategies in the light of the Fukushima Daiichi accident including severe accident analysis, technologies to prevent or mitigate severe accidents, emergency preparedness and response and post-accident recovery. The importance of the Secretariat's role in assisting Member States by continuing to provide a forum for discussion and information exchange on R&D-related matters was emphasized. The Secretariat's role in collecting and disseminating R&D information on safety improvements made in response to the Fukushima Daiichi accident was also highlighted. The experts considered that although there do not appear to be major R&D gaps that require immediate international attention, there are opportunities to strengthen long term research programmes on severe accidents and associated decommissioning activities.

39. The Secretariat continues to disseminate information and lessons learned from the Fukushima Daiichi accident. For example, the Secretariat made available the reports of the IEMs held in 2014 and 2015, namely:

- *IAEA Report on Severe Accident Management in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant;*
- *IAEA Report on Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant;*
- *IAEA Report on Assessment and Prognosis in Response to a Nuclear or Radiological Emergency; and*
- *IAEA Report on Capacity Building for Nuclear Safety*[14].

These reports are available on the Agency's website[15].

40. Following the decision taken by the Contracting Parties to the CNS during their Sixth Review Meeting, the IAEA Director General convened a Diplomatic Conference in February 2015 to consider a proposal by Switzerland to amend Article 18 of the Convention relating to the design and construction of both new and existing NPPs.

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[13] GOV/2015/26 (14 May 2015)
[14] The report took account of the International Conference on Human Resource Development for Nuclear Power Programmes: Building and Sustaining Capacity, held in May 2014.
[15] http://www.iaea.org/newscenter/focus/actionplan/

41. The Diplomatic Conference unanimously adopted the Vienna Declaration on Nuclear Safety. This Declaration included the following principles for the implementation of the third objective of the Convention, which is to prevent accidents with radiological consequences and to mitigate such consequences should they occur:

- New NPPs are to be designed, sited, and constructed, consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.
- Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner.
- National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA safety standards and, as appropriate, other good practices as identified inter alia in the Review Meetings of the CNS.

42. The fifth Review Meeting of the Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was held in May 2015. Four issues emerged from the discussions that will be highlighted in the next review process. These related to staffing, staff development, funding, and other human resource areas; maintaining and increasing public involvement and engagement in waste management to provide public confidence and acceptance; developing and implementing a holistic and sustainable management strategy for radioactive waste and spent fuel at an early stage; and the management of disused sealed sources. The Contracting Parties also decided on several actions aimed at, inter alia, encouraging adherence to the Joint Convention and active participation in the review process, and increasing the effectiveness of the review process for Contracting Parties without a nuclear power programme. An Extraordinary Meeting will be held in 2017, prior to the Organizational Meeting for the sixth Review Meeting (which is scheduled for 2018), to address some of these issues.

I. Conclusions

43. The Secretariat and Member States have made considerable progress in the implementation of the Action Plan since September 2014. This conclusion is supported by the assessment provided in the supplementary information to the present report and feedback from the IEMs and other relevant meetings.

44. Since the adoption of the Action Plan in 2011, many activities have been undertaken by the Secretariat, Member States and other relevant organizations to introduce concrete measures to strengthen nuclear safety worldwide. The Secretariat has initiated 68 projects with extrabudgetary funding in four years across all 12 actions of the Action Plan.

45. All Contracting Parties to the CNS with NPPs have reported on the national assessments of the vulnerabilities of their NPPs against site-specific extreme external events. Most of these safety assessments have been carried out in line with internationally organized processes and have included a subsequent peer review. Member States have also reported on the measures taken to implement

improvements, such as the provision of additional mobile diesel generators and mobile pumps and further specific measures to mitigate the impact of severe accidents. The Secretariat has supported Member States in their national assessments that have been reported in the present and previous reports.

46. The Secretariat has strengthened its peer review services and Member States' interest in these services has significantly increased since the adoption of the Action Plan in 2011. However, several Member States have yet to respond to the call in the Action Plan to voluntarily host Agency peer reviews and others have yet to request such reviews focused on their older NPPs.

47. All Contracting Parties to the CNS with NPPs have reported on the activities they have carried out to review and strengthen their EPR arrangements, including lengthening the duration of emergency situations being considered, evaluating events affecting multiple units, and extensive infrastructural damage. Progress has been made by the Secretariat and Member States in improving public information and enhancing transparency and communication during emergency situations. The Secretariat has taken steps to strengthen its capability to provide assessment and prognosis during a nuclear or radiological emergency.

48. A systematic review of the Agency Safety Requirements applicable to NPPs and the storage of spent fuel safety was undertaken by the Secretariat. The review did not find any major gaps in these Agency Safety Requirements but identified some areas for improvement. The revised Agency Safety Requirements applicable to NPPs and the storage of spent fuel, along with the proposed revision to the Safety Requirements for emergency preparedness and response, were approved by the Board of Governors in March 2015 to be established as Agency safety standards.

49. Member States reported on the use of the Agency's safety standards as the basis for their national regulations and requirements. The safety standards highlighted were those for management systems, safety assessment, NPP site evaluation, design, construction and decommissioning.

50. Member States planning to embark on a nuclear power programme highlighted the importance of the Agency's safety standards to the establishment or improvement of regulations and requirements for the introduction of a new NPP. They also emphasized the benefits of the Agency's INIR missions and other missions that cover infrastructure development needs for a nuclear power programme. These Member States have reported that they face challenges in maintaining competencies and transferring knowledge to new staff and have introduced education and training programmes, knowledge management systems, human resources performance improvement programmes and systematic analyses of future human resource needs.

51. Many Member States have taken steps to enhance and expand their environmental radiation monitoring and measuring capabilities. These steps have included extending environmental monitoring networks with mobile and fixed radiological and meteorological stations, automated real-time boundary radiation monitoring, and increasing resources for technical expert support and equipment. Improvements have also been made to methods for estimating accidental releases of radioactivity and to tools for aiding decision making when responding to a nuclear or radiological emergency. The Secretariat has continued to undertake activities to enhance Member States' capabilities for environmental monitoring and modelling and assessment of radiation exposures to people and the environment.

52. Since the adoption of the Action Plan, the Secretariat has undertaken many activities to analyse the relevant technical aspects and learn the lessons from the Fukushima Daiichi accident and to widely share these lessons. The Secretariat organized and conducted nine IEMs along with many other relevant conferences and meetings covering almost all of the areas under the Action Plan. The Secretariat prepared 12 reports that highlighted the expert discussions during the IEMs and other

conferences relating to the lessons learned. Fifteen international expert missions to Japan were carried out and the reports on these missions and other relevant information have been made available through the Action Plan dashboard.

53. The report on the Fukushima Daiichi accident considers human, organizational and technical factors and aims to provide an understanding of what happened, and why, so that the necessary lessons learned can and will continue to be acted upon by governments, regulators and NPP operators throughout the world.

54. While considerable progress has been made in the implementation of the Action Plan, work to maintain and strengthen nuclear safety requires ongoing attention. Dedicated projects under the Action Plan that are to continue beyond 2015, in particular those that address the lessons learned from the report on the Fukushima Daiichi accident and the IEMs, as well as the results of the completed Action Plan projects, will continue to be implemented by the respective Departments/Divisions. The Department of Nuclear Safety and Security will be the focal point for supporting cross-departmental activities aimed at strengthening nuclear safety.

55. The successful implementation of the Action Plan has demonstrated the full commitment of Member States, all relevant Departments of the Secretariat and other stakeholders to strengthening nuclear safety worldwide.