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Implementation of the IAEA Nuclear Security Plan 2010-2013

Report by the Director General

A. Introduction

1. In September 2009, the Board of Governors approved the third Nuclear Security Plan to cover the period 2010–2013[1]. The purpose of this document is to summarize the implementation of that plan, setting out details of the main activities undertaken and the outcomes achieved. Further details for each year are available in the relevant Nuclear Security Reports.[2]

2. The Agency's Nuclear Security Plan 2010–2013 was structured around four key areas: Needs Assessment, Information Collation and Analysis; Contributing to the Enhancement of a Global Nuclear Security Framework; Providing Nuclear Security Services; and Risk Reduction and Security Improvement.

3. All activities were undertaken either at the request of Member States or in accordance with relevant General Conference resolutions and decisions of the Board of Governors. Where relevant, interfaces between safety, security and safeguards were considered. Activities under the Nuclear Security Plan were implemented with respect to existing competencies throughout the Agency with a

[1] http://www.iaea.org/About/Policy/GC/GC53/GC53Documents/English/gc53-18_en.pdf

[2] http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf
http://www.iaea.org/About/Policy/GC/GC55/GC55Documents/English/gc55-21_en.pdf
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http://www.iaea.org/About/Policy/GC/GC57/GC57Documents/English/gc57-16_en.pdf

view to avoiding duplication and promoting both sustainability and the Agency's 'one house' approach.

4. The Agency's central role in nuclear security was recognized by Member States in numerous General Conference resolutions, in the Ministerial Declaration of the July 2013 International Conference on Nuclear Security: Enhancing Global Efforts, and in various other fora.

A.1. Global Context

5. The Nuclear Security Plan 2010–2013 was developed on the premise that the risk that nuclear or other radioactive material could be used in malicious acts remains real and is to be regarded as a serious threat to international peace and security. Because of the possible catastrophic consequences, preventing vulnerable material and associated facilities and activities from falling into the wrong hands is a shared priority of all States. It is well recognized that the responsibility for nuclear security rests entirely with each State and that appropriate and effective national systems for nuclear security are vital in facilitating the peaceful use of nuclear energy and enhancing global efforts to combat nuclear terrorism. The Agency assists States, upon request, in building a sustainable, effective global response to this global threat.

6. In implementing the Nuclear Security Plan 2010–2013, the Agency continued to support, upon request, States in their efforts to establish and maintain effective nuclear security regimes. Such support focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities. Activities under the Nuclear Security Plan 2010–2013 included the provision of peer reviews and advisory services; support to enable States to adhere to, and meet their obligations under, the international nuclear security instruments; the development of comprehensive education and training programmes; and the application of risk reduction measures such as the supply of technical equipment and upgrades. All activities were carried out with due regard to the protection of confidential information.

A.2. Objective of the Nuclear Security Plan

7. The objective of the Nuclear Security Plan 2010–2013 was to contribute to global efforts to achieve worldwide, effective security, irrespective of where nuclear or other radioactive material is in use, storage and/or transport, and of associated facilities, by supporting States, upon request, in their efforts to establish and maintain effective nuclear security through assistance in capacity building, guidance, human resource development, sustainability and risk reduction. The objective was also to assist States in their adherence to and implementation of nuclear security related international legal instruments; and to strengthen the international cooperation and coordination of assistance provided through bilateral programmes and other international initiatives in a manner which also would contribute to enabling the safe, secure and peaceful use of nuclear energy and of such applications with radioactive substances. This objective was consistent with the Agency's Medium Term Strategy for the period 2006–2011 and for the period 2012–2017.

B. Needs Assessment, Information Collation and Analysis

B.1. Integrated Nuclear Security Support Plans

8. From 2010 to 2013, the Agency accelerated the development of Integrated Nuclear Security Support Plans (INSSPs) with States interested in improving and sustaining their nuclear security regimes with assistance from the Agency. INSSPs were developed voluntarily between the Agency and each recipient State in order to identify the national nuclear security needs of States and to establish plans for the necessary steps to address those needs and to coordinate, where appropriate, bilateral and multilateral initiatives.

9. From 2010 to 2013, 33 States formally approved their INSSPs and began implementation of the plans. The Agency finalized an additional 16 INSSPs with States during this period, but as of December 2013 the plans were pending approval. The Agency also held joint review meetings for the 18 INSSPs established before 2010 in order to ensure the INSSPs were kept up to date. As such, by the end of December 2013, the Agency had worked with a total of 67 States to establish and/or implement INSSPs.

10. In June 2012, the Agency convened a topical meeting to raise awareness among States of the purpose and importance of INSSPs. The meeting was attended by policymakers and technical experts from 52 States and served as a forum for sharing experiences and lessons learned from the development and implementation of INSSPs. At the meeting, States voiced strong support for the programme, and 20 States new to the programme requested the establishment of INSSPs for their States. The Agency later scheduled an additional 20 INSSP finalization meetings, during which INSSPs were finalized and approved.

11. The Agency organized three regional/subregional workshops in 2013 to further facilitate the sharing of experiences and good practices on the development and implementation of INSSPs. A workshop for States in the Asia and the Pacific region was convened in Kuala Lumpur, Malaysia, in June 2013. The workshop was attended by policymakers and technical experts from 17 States, and led to the initiation of 6 new INSSPs and the exchange of experiences between the remaining 11 participating States, all of which had already begun establishing INSSPs with the Agency. Regional workshops were also held in Botswana for English speaking States in Africa, and in Morocco for French speaking States in Africa. These workshops were attended by 32 States, and led to the initiation of 10 new INSSPs for States in Africa.

12. **Outcomes**: Improved awareness among States of their nuclear security needs through the use, on a voluntary basis, of INSSPs. The Agency responded to an increasing number of requests from States to establish INSSPs, resulting in an improved and more comprehensive understanding of nuclear security priorities on the national, regional and global levels. This, in turn, has allowed the Agency to focus its nuclear security support on addressing nuclear security needs of States in a systematic, prioritized, and sustainable manner. Moreover, with specific permission from the recipient States, and while fully protecting sensitive information, the Agency has also been able to communicate States' needs that were identified in their INSSPs to potential donors that could assist in addressing those needs.

B.2. Nuclear Security Information Management System

13. In an effort to assist States, upon request, to establish and maintain effective national nuclear security regimes, the Agency developed a voluntary collaborative information management system

called the Nuclear Security Information Management System (NUSIMS), which was released in 2013. NUSIMS is a self-assessment system designed to provide States and the Agency with a secure means to aggregate and analyse State-specific nuclear security related information, to help identify States' needs, to track the progress of implementation, as well as to assist in the planning and prioritization of future activities. NUSIMS has promoted close interaction between the Secretariat and designated NUSIMS points of contact in Member States.

14. A pilot workshop was held in 2013 to review, revise and provide feedback on NUSIMS and ultimately validate its structure and confirm its viability, stability and usability by real users. Participants' experience of using NUSIMS in the pilot workshop emphasized that the design, structure, functionality and user interface enables States to systematically and productively review their nuclear security infrastructure and identify and prioritize their nuclear security improvements.

15. **Outcomes:** Increased capacities of States to perform self-assessments and track progress of their national nuclear security activities. NUSIMS is a comprehensive and secure system supported by a workflow and process that is well-suited to assist States in better coordinating and managing their national nuclear security needs and priorities. In addition, NUSIMS will assist with the optimization of Agency resources to focus on the priorities of States and avoid duplication.

B.3. Incident and Trafficking Database

16. The Incident and Trafficking Database (ITDB) is the Agency's information system on incidents of illicit trafficking and other unauthorized activities and events involving nuclear and other radioactive material outside of regulatory control. The ITDB facilitates the exchange of authoritative information on incidents among participating States.

17. Between 2010 and 2013, 16 new States joined the ITDB programme, bringing the total number of participants at the end of the period to 125. From 2010 to 2013, 662 incidents were reported to the ITDB by States. Sixty-three of the reported incidents involved such activities as unauthorized possession and/or attempts to sell or smuggle nuclear or other radioactive material; 157 additional incidents involved the theft or loss of nuclear or other radioactive material; in less than one-third of those incidents, the material has not been reported as recovered.

18. Out of the 662 reported incidents, 445 involved unauthorized activities without apparent relation to criminal activity. These included the detection of nuclear material or radioactive sources disposed of in unauthorized ways, the detection of radioactively contaminated material, the recovery of radioactive material outside of regulatory control and the discovery of nuclear material or radioactive sources in unauthorized or undeclared storage.

19. High enriched uranium (HEU) was present in eight of the incidents, of which two involved attempts to sell the material. In one of these two incidents there were higher levels of organization among the criminal group than had previously been witnessed and the incident also demonstrated similarities to sales of HEU that had been attempted on two previous occasions. During the period, the ITDB also received reports on incidents involving 28 category 1–3 radioactive sources[3]. Twenty-four of these sources were stolen or otherwise lost and eight of the 24 have not been reported as recovered.

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[3]The ITDB categorizes sealed radioactive sources, in accordance with *Categorization of Radioactive Sources* (IAEA Safety Standards Series No. RS-G-1.9), as being in one of five categories. The exposure of only a few minutes to a Category 1 source can be fatal. Category 5 sources are potentially the least dangerous; however, even these sources could give rise to doses in excess of safe limits if not properly controlled.

20. Information reported to the ITDB demonstrated that the availability of unsecured nuclear and other radioactive material persisted and that individuals and groups were prepared to engage in trafficking in this material.

21. A meeting of the ITDB Points of Contact took place in Vienna in July 2012 and was attended by 90 participants representing 81 States. The purpose of the meeting was to discuss, review and endorse proposed changes to the ITDB framework.

22. The above meeting resulted in significant developments in the operations of the ITDB, including the adoption of the database's new name that more accurately reflects its scope, namely Incident and Trafficking Database (ITDB) since it was agreed that the ITDB should cover incidents of nuclear and other radioactive material out of regulatory control.

23. Another major development was the conversion of the ITDB information and workflow system from a distributed, hardcopy system into a centralized web-based information submission and dissemination system. This new electronic system — hosted on the Agency's secure Nuclear Security Information Portal (NUSEC) — features, inter alia, ITDB incident reports and analytical reports, and tools such as Web ITDB — which details all reports submitted by States to the ITDB. It provides Member States with the capability to access and analyse information on officially submitted ITDB incidents.

24. During 2010–2013, various ITDB-related subregional meetings were held for States from the Black Sea region, Central America and the Caribbean, Central and Southern Africa, North Africa and the Middle East, South America, South Asia, Southeast Asia and Southeast Europe. The meetings were aimed at promoting awareness of the ITDB, including analyses of incidents and the associated information handling and dissemination processes of incidents reported by States. A meeting aimed at promoting the benefits of joining the ITDB programme was also held in 2012 for non-participating States.

25. **Outcomes**: Increased sharing of information and analyses between the Agency and States on incidents of illicit trafficking and other unauthorized activities and events involving nuclear and other radioactive material outside of regulatory control. Furthermore, the Web ITDB allowed, for the first time, a State's nuclear security practitioners direct and timely access to up-to-date ITDB information. Analysis of information reported to the ITDB contributed to an improved understanding of national, regional and global nuclear security needs.

B.4. Cooperation and Information Exchange

B.4.1. International Conference on Nuclear Security: Enhancing Global Efforts

26. The Agency organized the International Conference on Nuclear Security: Enhancing Global Efforts[4], in Vienna, in July 2013, attended by more than 1300 registered participants from 125 States, including 34 representatives at the Ministerial level, and representatives from 21 organizations. The Conference provided a forum where experiences and lessons learned, inter alia, through the implementation of the Nuclear Security Plan 2010–2013, could be discussed and ideas exchanged to identify emerging trends and to consider medium and long term objectives for international nuclear

[4] http://www-govatom.iaea.org/DocumentDetails.asp?Language=English&Path=f:\websites\govatom\govatomdocs\govinf\2013\gov-inf-2013-09-gc(57)-inf-06\gov-inf-2013-9-gc-inf-57-6.doc

security efforts. The outcome of the Conference was taken into account in the development of the Agency's Nuclear Security Plan for 2014–2017. Furthermore, the conference demonstrated the Agency's ability to enhance political awareness and at the same time to address policy, technical and regulatory issues.

27. An important achievement of the conference was the adoption by consensus of the Ministerial Declaration[5]. The Declaration demonstrated a strong public commitment to the common goal of strengthening nuclear security worldwide.

B.4.2. Information Exchange

28. In response to the relevant General Conference resolutions which encouraged the Secretariat to play a constructive and coordinated role in nuclear security related initiatives, and to work jointly, as appropriate, with relevant international organizations and institutions, the Agency initiated a Nuclear Security Information Exchange Meeting in May 2011. The purpose of the meeting was to bring together relevant organizations and initiatives and discuss how to improve cooperation and coordination in order to avoid unnecessary overlaps and duplication of efforts in the area of nuclear security through the exchange of information. In addition to the Agency, the following eight entities participated in the meeting: the 1540 Committee of the United Nations Security Council established pursuant to resolution 1540, the United Nations Office for Disarmament Affairs, the United Nations Office on Drugs and Crime, the Counter-Terrorism Implementation Task Force, the Group of Eight Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, the Global Initiative to Combat Nuclear Terrorism (GICNT), the hosts of the Nuclear Security Summits, and the World Institute for Nuclear Security. The meeting agreed to continue further dialogue at working level and to hold further meetings.

29. The Agency organized additional meetings in February, May and November 2012 and in May and December 2013. In addition to those that participated in the first meeting, the following four organizations joined the additional meetings: the United Nations Interregional Crime and Justice Research Institute, the Police Community of the Americas, the Joint Research Centre of the European Commission, and the Organization for Security and Co-operation in Europe.

30. In addition to organizing these meetings, the Agency continued to play a constructive role in nuclear security related initiatives, including the GICNT, and to work jointly with relevant international and regional organizations and institutions by participating in events organized by them and by inviting them to take part, as appropriate, in Agency events.

B.4.3. Working Groups

Working Group on Radioactive Source Security

31. The Agency initiated efforts to better coordinate its activities to promote the security of radioactive sources with Member States' programmes. This included the establishment of the Working Group on Radioactive Source Security (WGRSS), which held its first two meetings in November 2012 and May 2013. The WGRSS provides a forum to share experience and feedback on the success of

[5] After the adoption of the Ministerial Declaration, one Member State made a statement to express reservations, but did not object to reaching consensus on the document. This statement is on the IAEA website at

http://www-pub.iaea.org/iaeameetings/cn203p/RussianFederation-PDF.pdf

relevant initiatives in this area. Participation in the WGRSS has increased from 20 to 35 Member States, in addition to observer organizations.

Border Monitoring Working Group

32. The Agency continued to ensure effective use of resources and coordinated approaches to the provision of support to States through biannual meetings of the Border Monitoring Working Group (BMWG). The BMWG is a mechanism that was established by the Agency in 2006 to coordinate the activities of the Agency and other major donors working in the area of effective border controls.

33. **Outcomes**: Having forums such as the WGRSS and BMWG to discuss technical issues related to radioactive source security and border monitoring has been viewed as beneficial to a variety of stakeholders, including donors and recipients of assistance. The coordination mechanism provided by these working groups has helped avoid duplication in the provision of support and assistance to States, ensured that the resources of the Agency and major donors are used in the most effective manner, ensured consistency between the content of training material delivered by the Agency and the major donors, and ensured coordination in the delivery of training and the conduct of workshops and exercises by the members of the working groups.

Practical Arrangements

34. The Agency concludes Practical Arrangements in order to set forth the framework of cooperation between the Agency and national, regional and international organizations. Over the four year period, Practical Arrangements in the area of nuclear security were concluded with 17 national, regional and international organizations. These Practical Arrangements focus in general on the Agency's human resource development programme in nuclear security, addressing both education and training in nuclear security. They facilitate the entire support process by increasing predictability in the planning and delivery of the programme.

35. **Outcomes**: Improved planning and implementation of activities, particularly those relating to human resource development, through the development of agreed timetables to host training events of the Agency and to provide other assistance in kind in support of the implementation of the Nuclear Security Plan 2010–2013.

B.5. Information Security and Computer Security Activities

36. In response to the growing threat of cyberattacks, Member States encouraged the Agency to provide assistance in this area by developing appropriate guidance documents, providing training courses and hosting further expert meetings specific to cybersecurity at nuclear facilities[6].

37. The Agency accordingly implemented a significant number of activities to support States' requests. The objective of the activities was to provide States with the guidance and expertise they need to develop and implement effective information and computer security to enhance their overall national nuclear security regime.

38. Activities over this period included the publication of *Computer Security at Nuclear Facilities* (IAEA Nuclear Security Series No. 17). The Agency also drafted three additional documents; developed the Integration of Computer Security IPPAS module, which was used on seven IPPAS

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[6] See, for example, para. 17 of http://www.iaea.org/About/Policy/GC/GC55/GC55Resolutions/English/gc55res-10_en.pdf

missions; held expert meetings, including three Technical Meetings, and seven international, regional and national training courses, including a new training course on conducting computer security assessments; and helped establish a professional development course, together with an associated textbook on cybersecurity for nuclear security professionals.

39. **Outcomes**: Enhanced awareness by States of threats to computer systems at nuclear facilities and facilities in which radioactive material is used or stored and of potential threat factors, as well as of the principles of information security, including the protection of sensitive information. The Agency's work has led to increased capacity building of States through the provision of national training courses and new guidance to assist in the development of cybersecurity regulations for nuclear security purpose.

B.6. Advisory Group on Nuclear Security

40. The Advisory Group on Nuclear Security (AdSec) continued to meet regularly and, through the Chairman's reports on AdSec meetings, to provide advice to the Director General on the Agency's nuclear security programme. Until the establishment of the Nuclear Security Guidance Committee (NSGC) in 2012, AdSec had also provided advice on the development of nuclear security guidance publications, including the Nuclear Security Fundamentals and Recommendations. Members of AdSec participated in the Joint Task Force of AdSec and the Commission on Safety Standards, which, inter alia, recommended the establishment of NSGC.

41. In 2012, following the establishment of NSGC, AdSec's Terms of Reference were revised, inter alia, extending AdSec's functions to include advising the Director General on current and emerging nuclear security issues (in addition to its existing functions of providing advice on priorities for and implementation of the Agency's nuclear security programme).

42. **Outcomes**: Increased scope for AdSec to provide advice to the Director General on a wider range of nuclear security related topics as a result of its modified Terms of Reference.

C. Contributing to the Enhancement of a Global Nuclear Security Framework

C.1. Regulatory Assistance and Facilitation of Adherence to and Implementation of International Instruments

43. The international legal framework for nuclear security embodies both binding and non-binding instruments adopted under the auspices of the Agency and other entities. The Agency facilitates adherence to and implementation of the legal framework by assisting States in effectively implementing their obligations under the relevant international instruments.

C.1.1. Convention on the Physical Protection of Nuclear Material

44. Throughout the period covered by the report, the Agency continued to promote the entry into force of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM). During this period, 38 States adhered to the Amendment.

45. In November 2010, the Secretariat convened a meeting in Vienna on facilitating adherence to the 2005 Amendment to the CPPNM, which was attended by 55 States. In 2011, 2012 and 2013, the Agency organized a total of four regional workshops in Africa, Asia, Latin America and Europe and one workshop focusing on the French-speaking States Parties in Africa to foster information exchange to facilitate States' adherence to and implementation of the Amendment. Through these workshops, the Agency reached out to 51 States Parties to the CPPNM to facilitate their adherence to and implementation of the 2005 Amendment to the CPPNM.

46. In addition, in 2012, the Director General wrote to the Ministers for Foreign Affairs of all States Parties of the CPPNM that had not ratified the 2005 Amendment at that time. In his letter, the Director General stressed the importance of the 2005 Amendment to the CPPNM in strengthening the global nuclear security framework, highlighted the urgent need for its entry into force at the earliest possible time, and encouraged each State to expedite its national ratification process.

C.1.2. Code of Conduct on the Safety and Security of Radioactive Sources and Supplementary Guidance on the Import and Export of Radioactive Sources

47. The Code of Conduct on the Safety and Security of Radioactive Sources and the supplementary Guidance on the Import and Export of Radioactive Material are non-binding international legal instruments that provide guidance for ensuring the control of radioactive sources and for mitigating or minimizing any consequences should control measures fail.

48. Between 2010 and 2013, the number of States that informed the Director General of their intention to implement the Code of Conduct rose from 99 to 120. Furthermore, the number of States that supported the supplementary Guidance increased from 59 to 81. This upward trend is indicative of the international recognition that these instruments are essential for the establishment of national security frameworks for radioactive sources. In October 2013, the Agency organized the International Conference on the Safety and Security of Radioactive Sources: Maintaining the Continuous Global Control of Sources Throughout Their Life Cycle in Abu Dhabi, United Arab Emirates, which coincided with the 10th anniversary of the approval of the Code of Conduct by the Agency's Board of Governors. One of the key findings of the conference was the recognition of the importance of the IAEA Nuclear Security Series publications with respect to the security of radioactive material and associated facilities.

49. **Outcomes**: Increased awareness of and commitment by States to the 2005 Amendment to the CPPNM and its extension of physical protection provisions to include nuclear material in domestic use, storage and transport and nuclear facilities and protection against sabotage of material and facilities for peaceful purposes, since 38 States became Parties to the 2005 Amendment to the CPPNM from 2010 to 2013. Increased support of the Code of Conduct as demonstrated at the Abu Dhabi conference, which provided an opportunity for all States that have made a political commitment (119 States at the time of that conference) to assess their level of implementation of activities for ensuring the safety and security of radioactive sources. The sharing of experiences and challenges also served to encourage those States which have not already done so to express their support for the Code of Conduct and its supplementary Guidance on the Import and Export of Radioactive Sources.

C.2. Guidance

C.2.1. Nuclear Security Guidance Committee

50. The NSGC was established by the Director General in 2012 as a standing body of senior representatives in the area of nuclear security, open to all Member States. The purpose of the NSGC is

to make recommendations to the Secretariat on the development and review of IAEA Nuclear Security Series publications. The objective is to contribute to greater transparency, consensus, quality, coherence and consistency by engaging more Member States in the development of international publications for nuclear security. As of the end of 2013, 54 Member States had nominated members for the NSGC.

51. A mechanism was also established by which draft nuclear security guidance on areas of security having interfaces with safety would be reviewed by the relevant Safety Standards Committees, as well as by the NSGC, and draft safety standards having interfaces with nuclear security would be reviewed by the NSGC as well as the Safety Standards Committees. More than three-quarters of the draft nuclear security guidance publications and safety standards currently in development were designated as 'interface documents' for review by both security and safety committees.

52. Meetings of the NSGC were held in Vienna, in June and December 2012, and in May and October 2013. As well as reviewing and approving drafts of, and proposals for, nuclear security guidance publications, and reviewing and approving safety standards on subjects in which there are identified safety–security interfaces, the NSGC advised the Secretariat on a plan for publications in the IAEA Nuclear Security Series.

53. The publications plan, as recommended by the NSGC, gives priority to completing the tier of Implementing Guides giving guidance on how to implement the Nuclear Security Recommendations published in 2011 and on broad thematic topics in nuclear security. As of the end of 2013, about half of the Implementing Guides in the plan had been published or approved for publication, and most of the remaining half were in preparation.

C.2.2. Publications Issued during the Reporting Period

54. The lead publication in the IAEA Nuclear Security Series, *Objective and Essential Elements of a State's Nuclear Security Regime* (IAEA Nuclear Security Series No. 20), was endorsed by the Board of Governors in September 2012 and subsequently published as a Nuclear Security Fundamentals category of publication in 2013.

55. Three second-tier Recommendations publications were issued in 2011, namely *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)* (IAEA Nuclear Security Series No. 13), *Nuclear Security Recommendations on Radioactive Material and Associated Facilities* (IAEA Nuclear Security Series No. 14), and *Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control* (IAEA Nuclear Security Series No. 15).

56. Three Implementing Guides were published in the reporting period. *Nuclear Security Systems and Measures for Major Public Events* (IAEA Nuclear Security Series No. 18) was published in 2012, providing guidance for a State to develop detection and response systems and measures in the context of preparations for a major public event. *Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme* (IAEA Nuclear Security Series No. 19) was published in March 2013 as a companion publication to support *Milestones in the Development of a National Infrastructure for Nuclear Power* (IAEA Nuclear Energy Series No. NG-G-3.1). *Nuclear Security Systems and Measures for the Detection of Nuclear and Other Radioactive Material out of Regulatory Contro*l (IAEA Nuclear Security Series No. 21) was also published in 2013. It expanded on the recommendations contained in IAEA Nuclear Security Series No. 15 relating to the detection of nuclear and other radioactive material out of regulatory control.

57. Three more detailed Technical Guidance publications were also issued in the reporting period: *Educational Programme in Nuclear Security* (IAEA Nuclear Security Series No. 12), *Identification of Vital Areas at Nuclear Facilities* (IAEA Nuclear Security Series No. 16), and *Computer Security at Nuclear Facilities* (IAEA Nuclear Security Series No. 17).

C.2.3. Publications Drafted during the Reporting Period

58. As of the end of 2013:

- Five draft Implementing Guides had been approved by the NSGC for publication on: security of information in nuclear security; security of nuclear material in transport; use of nuclear material accountancy and control for nuclear security purposes; threat assessment and risk informed approach for nuclear and other radioactive material out of regulatory control; and radiological crime scene management.
- Two draft Implementing Guides had been submitted for comment to all Member States and comments had been received, but final drafts had not yet been submitted to the NSGC for approval. These two draft Implementing Guides cover: nuclear forensics in support of investigations; and development of a national nuclear forensics library.
- A further ten new Implementing Guides were being drafted and had not yet been submitted to Member States for comment. These include: guidance on four cross-cutting topics in nuclear security, including capacity building and sustainability; guidance on a number of topics relating to nuclear and other radioactive material out of regulatory control, including a national framework for managing nuclear security events; and the main Implementing Guide in support of the recommendations in IAEA Nuclear Security Series No. 13 (INFCIRC/225/Rev. 5).
- The NSGC had approved the initiation of work to revise three existing Implementing Guides to reflect recent developments and to ensure consistency with the Nuclear Security Fundamentals and Recommendations on: preventive and protective measures against inside threats (revision of IAEA Nuclear Security Series No. 8); security in the transport of radioactive material (revision of IAEA Nuclear Security Series No. 9); and security of radioactive material in use and storage, and of associated facilities (revision of IAEA Nuclear Security Series No. 11, to be the main Implementing Guide in support of the recommendations in IAEA Nuclear Security Series No. 14).
- Eight more detailed Technical Guidance publications were in various stages of drafting, covering a variety of more specific topics.

59. **Outcomes**: Increased participation of Member States in the preparation of the Agency's nuclear security guidance and greater transparency, quality, coherence and consistency through the establishment of the NSGC. Progress was made in issuing publications in the IAEA Nuclear Security Series, which further assisted States in meeting the requirements set out in international legal instruments and taking into account Member States' good practices. The 'interface document' procedure facilitated improved coordination in the development of guidance on safety and security.

C.3. Research & Development

C.3.1. Coordinated Research Projects

60. Coordinated research projects (CRPs) are an important mechanism of the Agency's work in the area of nuclear security. CRPs bring together researchers in both developing and industrialized States to solve a problem of common interest. The mechanism allows and facilitates the involvement of

Member State institutions in contributing to advancements in key disciplines within nuclear security. The projects initiated or completed within the reporting period are described in the following paragraphs.

61. A CRP entitled "Application of Nuclear Forensics in Illicit Trafficking of Nuclear and other Radioactive Materials" ran from 2008 to 2012 with participants from seven Member States. Through diverse research topics that incorporated field based methods and evidence collection, laboratory based procedures and techniques, as well as modelling and interpretation, the technical work delivered procedures for enhanced categorization and characterization of seized nuclear and other radioactive material out of regulatory control, techniques to preserve forensics evidence, and solutions to strengthen nuclear forensics as part of Member State's nuclear security infrastructure.

62. A CRP entitled "Identification of High Confidence Nuclear Forensics Signatures for the Development of a National Nuclear Forensic Library" started in 2013 and will run until 2016. The objective of this research is to evaluate what data to include in a development of a national nuclear forensics library to assist States in determining the origin and history of nuclear and other radioactive material out of regulatory control. Topics in this CRP include nuclear forensic signatures derived from environmental samples, modelling of data characteristics of irradiated and spent nuclear fuel to identify the production reactor, nuclear forensic signatures obtained from samples seized in illicit trafficking incidents, and data characteristics from the production of uranium ore concentrates and fresh UO2 fuels.

63. A CRP on the development of a methodology for risk assessment and State management of a nuclear security regime, which began in September 2009, was concluded in 2012. This CRP aimed to develop methodologies for identifying nuclear security risks across the entire potential nuclear fuel cycle and for self-assessment within a State, as well as for informing and guiding government and policymakers in managing effective and efficient nuclear security. Ten research groups from seven Member States participated in the CRP. The outcome of the CRP was published in the form of working material and documents on the nuclear security regime and requirements for nuclear security risk assessment at State level.

64. In December 2012, the Agency initiated a new CRP entitled "Development of Nuclear Security Assessment Methodologies (NUSAM) for Regulated Facilities". This CRP aims to answer questions such as whether the physical protection system designed and implemented is adequate to protect nuclear and other radioactive material and facilities against a given threat, irrespective of the regulatory approaches in place.

65. **Outcomes**: Enhanced sharing of information and results in key disciplines within nuclear security with a focus on documented procedures, methods and techniques as well as advancements in analysis and interpretation through the forum of coordinated research projects. An Agency publication summarizing the research findings of one of the recently concluded research projects was issued as *Application of Nuclear Forensics in Combating Illicit Trafficking of Nuclear and Other Radioactive Material* (IAEA-TECDOC-1730).

D. Providing Nuclear Security Services

D.1. International Nuclear Security Advisory Service

66. The International Nuclear Security Advisory Service (INSServ) assists a requesting State to review the status of its nuclear security infrastructure, identify capabilities, determine improvements and identify needs for additional functional and infrastructure elements with the purpose of supporting sustainable nuclear security regimes in Member States with regard to material out of regulatory control.

67. Since 2010, INSServ was revised so that it now has a modular format. This allows States to select modules depending on their needs and facilitates more targeted assistance. Modules address nuclear security infrastructure, detection and response systems and measures, and nuclear security at major public events.

68. From 2010 to 2013, 25 INSServ missions were conducted, which resulted in 25 new or updated INSSPs, nine projects on the establishment of a framework and pilot deployment of radiation detection equipment to detect and respond to radioactive material out of regulatory control for Albania, Bolivia, Chile, Colombia, Cuba, Indonesia, Libya, Uruguay and the Bolivarian Republic of Venezuela, and the provision of assistance in implementing nuclear security measures at major public events, through ten INSServ missions covering major public events in Belarus, Cambodia, Gabon, Malaysia, Mexico, Poland, Sri Lanka, Ukraine, Zambia and Zimbabwe.

69. **Outcomes**: The reports of INSServ missions served to promote and optimize Agency assistance and support in key areas. In particular, INSServ missions resulted in improved awareness and understanding of the further steps to be taken to develop and/or enhance a State's national nuclear security infrastructure and detection and response systems and measures and/or preparations for detection and response at venues and other strategic locations in the context of a major public event.

D.2. International Physical Protection Advisory Service

70. The International Physical Protection Advisory Service (IPPAS) is a fundamental part of the Agency's efforts to assist States, upon request, to establish and maintain an effective physical protection regime to protect against unauthorized removal of nuclear and other radioactive material and against sabotage of nuclear and other radioactive material, associated facilities and associated activities with regard to regulated material facilities and activities. Twelve IPPAS missions, of which three were follow-up missions, were conducted in the four year period to the following States: Australia, Cuba, Finland, France, Hungary, Kazakhstan, the Netherlands, Romania, Slovenia, Sweden, the United Kingdom and the United States of America. In addition, an IPPAS mission was carried out to the Agency's laboratories in Seibersdorf, Austria. During these IPPAS missions, recommendations and suggestions were provided to the host countries and the Agency regarding further enhancement of nuclear security, and many good practices were identified, which could contribute to the enhancement of nuclear security in other States. Since 2011, the IAEA Nuclear Security Series publications, including the Fundamentals and the Recommendations have been used as the basis for recommendations during IPPAS missions.

71. Up to the end of 2013, 61 IPPAS missions had been conducted in 39 Member States. More than 140 experts from 34 Member States participated in the conduct of IPPAS missions as IPPAS team members or team leaders.

72. The Agency continued to work closely with States on meeting the needs for enhancement of their physical protection regimes, identified by previous IPPAS missions, including the provision of upgrades, the conduct of design basis threat workshops and a range of physical protection training events for personnel at nuclear facilities.

73. The Agency developed material for IPPAS workshops and held a pilot national workshop in July 2012 in China and a regional workshop in Australia in November 2012. National workshops on IPPAS were also conducted in China, Japan and the Republic of Korea in 2013.

74. The first international seminar on IPPAS experience and lessons learned was conducted in December 2013 in Paris, France, with 127 participants from 43 Member States. Participants provided proposals to the Agency regarding further enhancement of IPPAS, including the recommendation to organize such a seminar periodically (every 3–4 years). Based on the seminar findings, a comprehensive IPPAS strategy and an action plan for its implementation were developed by the Agency.

75. IPPAS guidelines consisting of a general part and five modules were prepared, updated and reviewed. Revision and expansion of the scope of IPPAS missions and the introduction of a modular approach have made the guidelines more flexible and responsive to the needs of States.

76. **Outcomes**: Increased voluntary use of IPPAS missions, effectively contributing to continuous improvements of the national nuclear security regimes of the hosting countries, including substantial enhancement of effectiveness of physical protection systems of nuclear and other radioactive material, facilities and transport. Increased international cooperation and awareness on the part of States of the need to share and implement nuclear security good practices at the national and international level. Increased confidence in the robustness of the national and global nuclear security regimes.

D.3. Human Resource Development

77. Human resource development is critical for States to be able to establish and maintain an effective and efficient nuclear security regime. Under the Nuclear Security Plan 2010–2013, the Agency continued to assist States, upon their request, in establishing educational and training programmes and other capacity-building measures for human resource development for nuclear security. The Agency worked in close consultation with Member States to develop a human resource strategy ranging from short courses to a pilot Master of Science degree programme in nuclear security.

D.3.1. Education

78. *Educational Programme in Nuclear Security* (IAEA Nuclear Security Series No. 12), published in 2010, outlines, among other things, a comprehensive Master of Science curriculum in nuclear security, which consists of 24 required and elective course topics, as well as an outline for a shorter, two-week certificate for university degree programmes. This curriculum provides an important foundation for an educational programme that can be custom-tailored to fit the needs of universities in Member States.

79. In the course of the development of this publication, discussions were held among a number of key universities around the world engaged in nuclear security and related educational activities, culminating in 2010 in the establishment of the International Nuclear Security Education Network (INSEN) as an implementation mechanism for IAEA Nuclear Security Series No. 12. The mission of INSEN is to promote excellence in nuclear security education, fostering the next generation of professionals. This mission is being achieved through the collaborative development of textbooks,

teaching materials and other aids, sharing information and resources, creating and facilitating opportunities for faculty professional development, promoting nuclear security education, and other joint pursuits. Membership of INSEN, initially counting fewer than 30 institutions, increased to over 100 in the period between 2010 and 2013. Currently institutions from 40 Member States of the Agency are represented in INSEN and the number continues to grow.[7]

80. Academic staff from member universities, in collaboration with other international experts, produced three textbooks and fourteen modules of teaching materials that are in line with the Agency's guidance on nuclear security. Over 10 professional development courses for over 150 academic staff were held by several INSEN members to prepare them to teach nuclear security courses at their institutions. Through the initiative of individual INSEN members, teaching materials are increasingly available in local languages.

81. In 2013, several member institutions of INSEN initiated a pilot project to implement the Master of Science in nuclear security degree through a European consortium. Vienna University of Technology (Austria), Brandenburg University of Technology (Germany), Delft University of Technology (the Netherlands), the University of Oslo (Norway), and Manchester University (United Kingdom) launched the degree programme in March 2013, with the first class expected to graduate in late 2014.

82. Another important initiative, aimed at young professionals from developing countries, the International School on Nuclear Security in Trieste, was initiated in 2011 by the Government of Italy and conducted by the Agency in 2011, 2012 and 2013 in cooperation with the Abdus Salam International Centre for Theoretical Physics (ICTP). Up to 50 young nuclear professionals from primarily developing countries attended each session of the school, which introduced them to the basics of nuclear security concepts, tools and principles.

D.3.2. Training

83. The Agency continued to implement a comprehensive training programme covering all aspects of nuclear security. The Agency sought to widen the programme through the development of new courses at the request of Member States, with priority given to courses that enable States to implement the guidance set out in the publications in the IAEA Nuclear Security Series.

84. Throughout the reporting period, the Agency delivered over 300 training courses in 26 areas of nuclear security, training over 5000 people.[8] The new training courses developed are described in the following paragraphs.

85. In the area of security in the transport of nuclear material, 19 national and regional training courses were delivered, as well as one international 'train the trainers' course. More than 600 participants, representing a wide range of stakeholders, including individuals from ministries, regulatory bodies, law enforcement, shippers and carriers, from all geographical regions were trained in the period 2010–2013.

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[7] INSEN membership is based on institutional rather than Member-State representation. Thus, several institutions from one Member State may participate in INSEN.

[8] As available on NUSEC

86. As part of the project on complex border monitoring, three new training curricula were developed:

- Gamma spectrometry and alarm resolution: specifically designed for developing practical skills required for the provision of in-situ and remote mobile expert support in case of detection alarms;
- Operation of integrated nuclear security networks: designed for developing practical skills required for the operation of the software packages covering national data analysis centres, alarm support centres and central alarm stations;
- Configuration, maintenance and repair of nuclear security equipment.

87. The Agency continued to expand its training in the areas of nuclear forensics and radiological crime scene management with different courses for each. In response to feedback from participants in training events, the need was identified to adopt independent, yet complementary, training curricula for nuclear forensics and radiological crime scene management. Consequently, the course entitled 'Introduction to Radiological Crime Scene Management and Nuclear Forensics' was replaced with a new curriculum that includes three training courses:

- Radiological crime scene management: this training course was developed on the basis of the draft Implementing Guide on radiological crime scene management. It aims to acquaint participants with the issues that are likely to arise in the course of a criminal investigation involving nuclear and other radioactive material and to enable them to handle such situations in an efficient and effective manner.
- Introduction to nuclear forensics: this training course uses expert lectures, table-top exercises and case studies to increase awareness and understanding consistent with a national response plan for the generalized conduct of a nuclear forensics examination. In the period from 2010 to 2013, this course was held in Algeria, Chile, China, Japan, Malaysia, the Netherlands and the Republic of Moldova.
- Nuclear forensics methodologies: this course was developed jointly by the Agency and the US National Nuclear Security Administration. It is directed at nuclear forensic analytical scientists and is focused on the optimization of practice measurements to include gamma and alpha spectroscopy, and the development of a nuclear forensic analytical plan to be utilized in the initial phases of a nuclear forensics examination.

88. Workshop material on threat assessment and the risk informed approach to protect nuclear material and facilities, which was based on *Development, Use and Maintenance of the Design Basis Threat* (IAEA Nuclear Security Series No. 10), was revised to include the guidance provided in the Recommendations set out in *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)* (IAEA Nuclear Security Series No. 13), and *Nuclear Security Recommendations on Radioactive Material and Associated Facilities* (IAEA Nuclear Security Series No. 14), and the Implementing Guide, *Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme* (IAEA Nuclear Security Series No. 19).

89. Two complementary training courses on nuclear material accountancy and control (NMAC) were developed. The first was designed specifically for implementation of NMAC for nuclear security purposes, and the second course was jointly developed and held by the Office of Nuclear Security and the Department of Safeguards.

90. The training course on preventive and protective measures against insider threats was redesigned to be in harmony with *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)* (IAEA Nuclear Security Series No. 13), and all related training material was modified. Training in this area was delivered in India, Japan and Malaysia.

91. A course on conducting computer security assessments was developed and first delivered in 2013 with the aim of assisting competent authorities and operators in developing assessment programmes for computer security implementation.

92. Workshop material on nuclear security for uranium ore concentrate was developed, and was first delivered in 2013 in Zambia.

D.3.3. E-Learning tools

93. The *Nuclear Security Report 2011*[9] contained details of an e-learning tool developed by the Agency and released in July 2010. The Agency's interactive e-learning programme on the use of radiation detection equipment is available in all official languages on the Agency website, on NUSEC and as a CD-ROM. The programme aimed at both increasing knowledge about the basic functions of radiation detection instruments and improving skills in the operation of such instruments, with the greater goal of increasing the effectiveness of States' abilities to detect and respond to incidents involving the presence of radioactive material outside of regulatory control.

94. In 2013, the Agency set out to expand the availability of introductory e-learning courses on nuclear security by initiating the development of five additional e-learning modules on: transport security; nuclear material accountancy and control for nuclear security; physical protection of nuclear and radioactive material and their associated facilities; radiological crime scene management; and computer security for nuclear applications. These courses will be finalized and made available to States in 2014.

D.3.4. International Network for Nuclear Security Training and Support Centres

95. In 2012, the Agency helped establish, and continued to facilitate the activities of, the International Network for Nuclear Security Training and Support Centres (NSSC Network), which comprises institutions designated by Member States as providing technical, human resource and other capacity building functions at the national and regional levels. At the meetings, which were held twice a year in Vienna, members of the NSSC Network, representing 46 Member States, exchanged information on training and outreach events and available resources, and coordinated their activities through emerging regional subgroups. The Network is organized around three working groups, which are focused on coordination and collaboration, sharing best practices and information management and emerging issues.

96. The NSSC Network worked to establish closer coordination and collaboration with INSEN — including plans to share teaching and training materials between the networks, provide technical expertise for academic programmes, as well as make available practical experience, equipment and facilities for INSEN institutions offering academic degrees. This coordination and collaborative relationship continued to develop in the period 2010–2013.

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[9] http://www.iaea.org/About/Policy/GC/GC55/GC55Documents/English/gc55-21_en.pdf

97. **Outcomes**: Improved capacities in States to establish and maintain sustainable national nuclear security regimes through better qualified personnel and the establishment of national and regional support centres. Increased information sharing and coordination between INSEN and the NSSC Network has led to better human resource and other capacity building activities in nuclear security.

E. Risk Reduction and Security Improvement

E.1. Physical Protection Upgrades, including Installation of Remote Monitoring Systems at Nuclear Facilities

98. The Agency continued to provide assistance, upon request, to States in upgrading technical physical protection systems at nuclear facilities. During the reporting period, significant upgrades were made (implemented in several phases) at four facilities in three States: at two research reactor sites of the Institute of Atomic Energy in Kazakhstan, at one research reactor site of the Ghana Atomic Energy Commission, and at the Armenian nuclear power plant. These upgrades included the installation of equipment for access control, detection and assessment systems, including upgrades of the central alarm station as well as physical barriers (strong doors, turnstiles, fences). In addition, a remote monitoring system was installed at a research reactor site in Nigeria. In providing this support, particular attention was given to the appropriateness of other elements of the nuclear security regime, such as the availability of relevant human and financial resources, and procedures for operation and maintenance, which are required to ensure the long term sustainability of the upgraded systems. Such upgrades were always supported by the necessary training of security personnel at the facilities.

99. The enhancement of physical protection systems, including remote monitoring systems, at nuclear research reactors and nuclear power plants helped States to improve their national nuclear security regimes. The supply of physical protection systems was a means by which States have been able to establish national technical capabilities and to put Agency recommendations and guidance into practice, minimizing the risk of malicious acts against nuclear facilities.

100. **Outcomes**: Reduced vulnerability and risk of sabotage of nuclear research reactors and nuclear power plants. Reduced risk of unauthorized removal of nuclear and other radioactive material from research reactors and nuclear power plants.

E.2. Detection Systems and Measures

101. The provision of radiation detection equipment for use at national points of entry, as well as for a range of internal activities, continued to be an essential component of the Agency's assistance to States, upon request, for detecting and performing the initial assessment of potential illicit trafficking in nuclear and other radioactive material, as well as the unauthorized movement of such material out of regulatory control.

102. Between 2010 and 2013, the Agency provided 21 States with 1091 instruments for radiation detection. Donations of equipment to States, complementing the overall architecture for detection and response to material out of regulatory control, were made throughout the world. The donated equipment consisted of 1041 hand-held detection instruments, 32 portable radiation scanner backpacks, and 18 fixed systems such as radiation portal monitors. Information technology items to support the use and maintenance of the instruments were deployed in conjunction with the fixed systems, including Integrated Nuclear Security Network (INSN) software, which transmits data to a

national data analysis centre within the State concerned to optimize a coordinated response mechanism. The INSN software package has been deployed in five Member States. The donated equipment was subject to performance testing by the Agency to ensure it met quality management requirements.

103. **Outcomes**: Improved capability for detection of nuclear and other radioactive material out of regulatory control was facilitated through the provision of training, equipment, and guidance for the detection of nuclear and other radioactive material out of regulatory control, allowing States to take responsibility for developing, operating, and sustaining their national nuclear detection strategies and programmes.

E.3. Response to Nuclear Security Events

104. Assisting Member States in developing effective and efficient capabilities for response to nuclear security events was an important activity carried out during the reporting period. This has included the provision of support in the following areas:

- Development of national nuclear security preparedness and response plans;
- Evaluation and prioritization of national response capabilities; and
- Development of human resources through training and exercises.

105. In cooperation with Member States, the following activities were implemented:

- Delivery of regional training courses on radiological crime scene management and introduction to nuclear forensics, held in Australia in 2012;
- Development of a training curriculum on radiological crime scene management in 2012 and 2013;
- Support for the implementation of the nuclear security specialist course on a State's response to a terrorist attack on a nuclear power plant, held at the European Nuclear Safety Training and Tutoring Institute (ENSTTI) in 2013 in cooperation with France;
- Delivery of a national workshop on multi-agency response to nuclear security events in India, held in 2013 in cooperation with the United Kingdom;
- Support for the preparation of nuclear security response exercises:
    - In Morocco and Spain in 2013 (REMEX 2013);
    - In Kuwait in 2013;
    - In Morocco in 2013 (ConvEx-3 2013), which was the first exercise conducted under the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency where the radiological emergency was triggered by a nuclear security event;
- Delivery of a pilot radiological crime scene management training workshop in the Czech Republic in 2013.

106. **Outcomes**: Strengthened national capabilities to respond to nuclear security events, as well as improved development of human resources through training and exercises. Improved Agency capability to respond to events involving nuclear security elements.

E.4. Use of Threat-based Risk Informed Approach to Regulate the Nuclear Industry

107. The Agency continued to assist States, upon request, in the establishment of formal threat assessment and a design basis threat, which is essential to the design and evaluation of nuclear security systems and measures. The concepts set out in the IAEA Nuclear Security Series publications relating to the philosophy behind the threat-based approach in designing and implementing security systems at nuclear facilities and facilities using or storing radioactive material formed the basis for workshops on design basis threat. These workshops attracted audiences from various national organizations that have a role in the development, implementation and maintenance of the design basis threat, such as regulatory bodies, operators of nuclear facilities and facilities using or storing radioactive material, law enforcement agencies, Ministries of the Interior and Foreign Affairs, and organizations with responsibilities for transport, maritime activities and emergency response.

108. Twenty-two national workshops on the development, use and maintenance of a design basis threat were held from 2010 to 2013, bringing the total number of design basis threat workshops delivered to date to 57.

109. **Outcomes**: Increased understanding in States of the use of a threat-based risk informed approach to develop and strengthen national nuclear security regimes for the protection of nuclear and other radioactive material, and facilities and associated activities under regulatory control. Increased number of States using design basis threat methodology to design, evaluate and regulate physical protection systems to improve nuclear security regimes at the national level and security systems and measures at the facility level.

E.5. Assistance in the Implementation of Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)

110. *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)* (IAEA Nuclear Security Series No. 13) was issued in January 2011 as a Recommendations-level publication. This revision of document INFCIRC/225 was intended to better address the current threat environment, to ensure better consistency with the 2005 Amendment to the CPPNM and other international instruments on nuclear security, and to provide clearer physical protection guidance to States seeking to improve existing physical protection programmes or to establish new nuclear power programmes. After the publication was issued, a comprehensive programme on physical protection of nuclear material and nuclear facilities was developed on the basis of the recommendations presented in the publication. The revision included a significant number of concepts not covered in previous versions, such as the concept of the four objectives of a physical protection regime; the concept of a State's physical protection regime comprising the twelve fundamental principles of physical protection; the introduction of a risk management approach and the link to the graded approach; defence in depth; categorization of nuclear material; and categorization of radiological consequences. The revision also expanded on a number of previously included concepts, such as additional measures to locate and recover missing or stolen nuclear material and the process for grading measures for protection against sabotage and measures to mitigate or minimize consequences.

111. Member States continue to refer to IAEA Nuclear Security Series No. 13 as an internationally accepted standard for physical protection of nuclear material and nuclear facilities in Agency project and supply agreements and in bilateral or trilateral agreements, such as the Agreement between the

International Atomic Energy Agency, the Government of Jamaica and the Government of the United States of America for Assistance in Securing Low Enriched Uranium for a Research Reactor (reproduced in document INFCIRC/858) and others.

112. **Outcomes**: Enhanced States' capabilities to meet their obligations under national and international legal frameworks and to better protect nuclear material and nuclear facilities. Application of IAEA Nuclear Security Series No. 13 has led to increased capabilities of designers and operators of nuclear facilities to better design, evaluate and implement physical protection systems. Enhanced confidence in regulatory bodies that use the publication as a standard to regulate the nuclear industry.

E.6. Nuclear Security Culture

113. The Agency continued activities in support of the practical development and improvement by States of nuclear security culture at nuclear fuel cycle facilities and associated activities throughout their lifetime as well as activities related to other radioactive material, including transport. Activities were based on the guidance set out in *Nuclear Security Culture* (IAEA Nuclear Security Series No. 7).

114. A Technical Meeting was held in April 2013 to further develop the Agency's nuclear security culture self-assessment methodology, which could then be applied by States. This methodology was used by Indonesia for carrying out a self-assessment of nuclear security culture at three research reactor sites. Subsequently, the Agency supported a trial of the self-assessment methodology at the Kozloduy nuclear power plant in 2013, at the request of Bulgaria.

115. The Agency continued its work to promote nuclear security culture by conducting international workshops in Chile and Finland, regional workshops in France, Ghana, Indonesia, Japan, the Republic of Korea, Morocco, and Peru, and national workshops in Bangladesh, Finland, Jordan, Kazakhstan, Pakistan, Slovakia and the Bolivarian Republic of Venezuela during the reporting period.

116. **Outcomes**: Increased institutional awareness regarding the importance of a strong nuclear security culture in ensuring the effectiveness and sustainability of nuclear security regimes in States through the delivery of large number of workshops at national, regional and international levels.

E.7. Repatriation of High Enriched Uranium

117. The Agency continued to be involved, at the request of Member States, in operations to repatriate HEU research reactor fuel to the country of origin. Under the auspices of the Russian Research Reactor Fuel Return (RRRFR) programme, the Agency assisted in the repatriation to the Russian Federation over the past four years alone of over 1200 kg of HEU from Belarus, the Czech Republic, Hungary, Kazakhstan, Poland, Serbia, Ukraine, Uzbekistan and Viet Nam.

118. The RRRFR programme was successful in supporting national efforts to minimize the use of HEU in research reactors. The programme repatriated both fresh HEU fuel and spent fuel and transported the material by aeroplane, boat, rail, and truck. The repatriation project from the Vinča Institute of Nuclear Sciences, Serbia, in 2010, in which nearly 400 Serbian and international experts, including 76 Agency staff members, participated, was the largest fuel repatriation project in the Agency's history.

119. Annual 'lessons learned' meetings to share experience of conducting the HEU repatriation projects and preparing future HEU removals took place in Hungary, Ukraine and the USA. At every annual meeting, participants from the 17 Member States involved captured the consolidated knowledge of this unique international programme.

120. **Outcomes**: Reduced use of HEU, at the request of the States concerned, in certain research reactors and improved security at the reactors.

E.8. Nuclear Material Accountancy and Control Relevant to Nuclear Security at Facilities

121. The use of a facility NMAC system is increasingly recognized as a critical element of nuclear security as it provides measures to detect malicious insider activities, and it provides critical information to help locate nuclear material that has potentially gone missing. The Agency developed draft guidance in the IAEA Nuclear Security Series on NMAC for security, and updated training courses and practical exercises to help States implement increased security at facilities.

122. **Outcomes**: Improved ability of States to account for and control nuclear material in a nuclear facility for nuclear security purposes. NMAC systems, when designed for nuclear security purposes, have helped detect irregularities associated with nuclear material, which in turn have provided a deterrent to potentially malicious insider activities.

E.9. Security of Radioactive Sources

123. The Agency continued to attach high priority to providing assistance to States, upon request, to increase the physical protection of radioactive sources throughout their life cycle in order to prevent illicit movement and other unauthorized activities, including malicious acts involving radioactive material. These efforts were focused on work with Member States to secure high activity radioactive sources in use and storage, as well as to develop and implement comprehensive and sustainable strategies for managing sources at the end of their life cycle.

124. Between 2010 and 2013, the Agency undertook at the request from States a number of activities to secure high activity sources, including the following:

- Fact-finding missions to perform engineering site assessments and to obtain information on inventories of high activity disused sources;
- Upgrades of physical protection systems at sites where high activity sources are used or stored such as hospitals, health centres, sterile insect technology facilities and sterilization plants, and radioactive waste facilities (in total 30 sites);
- The installation of 13 remote monitoring systems at hospitals, irradiation plants and radioactive waste disposal facilities;
- The conditioning and subsequent securing of 35 radioactive sources by means of mobile hot cell technology.

125. **Outcomes**: Increased awareness by States of the threats associated with high activity sources and the need to protect them. Strengthened practical knowledge and capabilities of States to sustain national efforts to improve nuclear security. Reduced risk that radioactive material could be used in malicious acts through improved physical protection of associated facilities. Enhanced recognition of the need to securely manage radioactive sources at all stages of their life cycle as a result of the Agency's comprehensive approach to providing assistance to States.

E.10. Transport security

126. From 2010 to 2013, the Agency's activities on transport security focused on increasing awareness and assisting States in human resource development, to support the development and

implementation of national regimes for the security of nuclear and other radioactive material in transport.

127. Following recommendations from an assessment mission to the Philippines, the Agency, in partnership with Australia and the USA, procured three custom-built high-security transportation boxes to be used, upon request, in a State's domestic movement of high-activity radioactive sources. In addition, a national training course, directed at carriers and tailored to meet the specific needs of that State, was also delivered.

128. **Outcomes**: Improved national transport security regimes and enhanced protection of nuclear and other radioactive material in transport.

E.11. Major Public Events

129. From 2010 to 2013, the Agency received 16 requests for assistance from 14 Member States related to the implementation of nuclear security systems and measures for major public events. These Member States were: Belarus, Brazil (two events), Cambodia, Colombia (two events), Gabon, India, Malaysia, Mexico, Poland, South Africa, Sri Lanka, Ukraine, Zambia and Zimbabwe. To establish a mechanism for cooperation and define the tasks to be jointly implemented in the framework of the major public event, a joint action plan was developed in each case between the host country and the Agency.

130. To support Members States in the implementation of nuclear security measures at major public events, the Agency maintains an equipment pool comprising high resolution spectrometry systems, portable radiation scanners (backpacks), radionuclide identification devices, neutron search devices and personal radiation detectors. During the period from 2010 to 2013, sets of equipment were provided on loan to Belarus, Brazil, Cambodia, Colombia, Gabon, Malaysia, Mexico, Poland, South Africa, Sri Lanka, Ukraine, Zambia and Zimbabwe.

131. **Outcomes**: The support provided through each joint action plan was successful and helped to determine the level of resources and preparedness required for effectively implementing nuclear security measures as part of the overall security plan for the event.

F. Outcomes of the Nuclear Security Plan 2010–2013

132. As stated above, the objective of the Nuclear Security Plan for 2010–2013 was to contribute to global efforts to achieve worldwide, effective security wherever nuclear or other radioactive material is in use, storage and/or transport, and of associated facilities, by supporting States, upon request, in their efforts to establish and maintain effective nuclear security through assistance in capacity building, guidance, human resource development, sustainability and risk reduction. The objective is also to assist States in their adherence to and implementation of nuclear security related international legal instruments; and to strengthen international cooperation and the coordination of assistance given through bilateral programmes and other international initiatives in a manner that also contributes to enabling the safe, secure and peaceful use of nuclear energy and of applications that involve radioactive substances. The Secretariat believes that the objective was fulfilled and that as a result of Agency activities the following outcomes have been achieved:

- Improved and a more comprehensive understanding of global nuclear security needs through the increased use of Agency advisory services and peer review missions, and self-assessment methodologies and better and more comprehensive reporting to the Incident and Trafficking Database;
- Better understanding in States of systematic and comprehensive improvements needed to enhance and continuously improve their national nuclear security arrangements through, inter alia, the development and implementation of Integrated Nuclear Security Support Plans;
- Better coordination of activities and cooperation, led by the Agency, among the various entities that assist States in meeting their national needs, thereby resulting in better use of limited resources and avoidance of unnecessary duplication;
- More comprehensive security through increased adherence by States to the global nuclear security framework and through the efforts made by States to meet their obligations under that framework, including the CPPNM and its 2005 Amendment and their commitment to the Code of Conduct on the Safety and Security of Radioactive Sources;
- Increased availability of more comprehensive nuclear security guidance for States, drawn up with wide participation from Member States through the Nuclear Security Guidance Committee and supported by the results of coordinated research projects;
- Improved national capacities in States through the development of a comprehensive human resource development programme covering education and training and sustained by the increasing use of national nuclear security support centres and underpinned by the education and training networks;
- Reduced risk that nuclear and other radioactive material in use, storage and transport, and their associated facilities could be used for malicious purposes, through the provision of comprehensive support programmes;
- A reduction in the amount of high enriched uranium in facilities as a result of Agency support for Member States' voluntary participation in programmes for the repatriation of high enriched uranium research reactor fuel;
- Improved capacities in States to detect and respond to nuclear security events involving nuclear and other radioactive material out of regulatory control.