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(GC(64)/1 and Add.1)

STRENGTHENING THE EFFECTIVENESS AND IMPROVING THE EFFICIENCY OF AGENCY SAFEGUARDS

Report by the Director General

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Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards

Report by the Director General

A. Introduction

1. The General Conference, in resolution GC(63)/RES/11 entitled ‘Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards’, requested the Director General to report on the implementation of the resolution to the General Conference at its 64th regular session. This report responds to that request and updates the information in last year’s report to the General Conference (document GC(63)/13)¹.

2. At the outset of the COVID-19 pandemic, the Director General stated that, despite the difficult situation, the Agency’s verification activities would not be interrupted. As a consequence, a series of mitigating actions were immediately implemented, drawing from business continuity and disaster recovery measures already in development.² The Agency has been able to conduct all of its most time-critical safeguards in-field verification activities, while rescheduling a number of activities, such as equipment installation and maintenance and verification activities that could be postponed without impact, to be completed over the course of the remainder of 2020. Those meetings, workshops and training courses planned for this period and needed to be postponed to late 2020 or early 2021, will be addressed under next year’s report. The Agency will continue to rely on the essential cooperation of States to implement safeguards, including to support any required increase in the frequency and intensity of originally planned activities for the remainder of 2020. Moreover, the Agency currently assesses that it will be able to draw soundly-based safeguards conclusions at the end of the year for all States, providing that it continues to receive all necessary cooperation and support from those States. This preliminary assessment is made on the assumption that the pandemic situation continues to steadily

¹ This report covers the period between 1 July 2019 and 30 June 2020.

² See GOV/INF/2020/7.

improve in the remainder of 2020 in a sizeable number of States, and does not significantly worsen in other States for which the Agency implements safeguards.

B. Safeguards Agreements and Additional Protocols

B.1. Conclusion and Entry into Force of Safeguards Agreements and Additional Protocols³

3. Additional protocols (APs) based on the Model Additional Protocol⁴ entered into force for two States^{5,6}. Small quantities protocols (SQPs) were amended for three States⁷, in keeping with the Board of Governors' decision of 20 September 2005 regarding such protocols. As of 30 June 2020, 63 States⁸ had an operative SQP in force based on the revised standard text, and 31 States had an operative SQP that had yet to be amended.

4. Between 1 July 2019 and 30 June 2020, a comprehensive safeguards agreement (CSA) with an SQP based on the revised standard text and an AP thereto entered into force for one State⁹.

5. As of 30 June 2020, 184 States¹⁰ had safeguards agreements in force with the Agency, 136 of which (including 130 States with CSAs) also had an AP in force. An AP has been applied provisionally since January 2016 for one State¹¹ pending its entry into force. As of 30 June 2020, 47 States had yet to bring into force APs to their safeguards agreements.

6. Ten States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)^{12,13} have yet to bring CSAs into force pursuant to Article III of the Treaty.

7. The latest status of safeguards agreements and APs is published on the Agency's website¹⁴.

³ GC/(63)/RES/11, OP 16

⁴ The text of the Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards is contained in document INFCIRC/540 (Corrected).

⁵ Benin and Ethiopia.

⁶ GC/(63)/RES/11, OP 18

⁷ Cameroon, Ethiopia and Haiti.

⁸ This number does not include two operative SQPs reproduced in INFCIRC/718/Mod.1 and INFCIRC/366/Mod.1, respectively.

⁹ Benin.

¹⁰ And Taiwan, China.

¹¹ Islamic Republic of Iran.

¹² The designations employed and the presentation of material in this section, including the numbers cited, do not imply the expression of any opinion whatsoever on the part of the Agency or its Member States concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

¹³ The referenced number of States Parties to the NPT is based on the number of instruments of ratification, accession or succession that have been deposited.

¹⁴ <https://www.iaea.org/sites/default/files/20/01/sg-ap-status.pdf> and <https://www.iaea.org/sites/default/files/20/01/sg-agreements-comprehensive-status.pdf>.

B.2. Promotion and Assistance in the Conclusion of Safeguards Agreements and Additional Protocols¹⁵

8. The Agency has continued to implement elements of the plan of action outlined in resolution GC(44)/RES/19 and in the Agency's updated *Plan of Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols*¹⁶. Among the elements of the plan of action proposed in resolution GC(44)/RES/19 are:

- Intensified efforts by the Director General to conclude safeguards agreements and APs, especially with those States having substantial nuclear activities under their jurisdiction;
- Assistance by the Agency and Member States to other States by providing their knowledge and the technical expertise necessary to conclude and implement safeguards agreements and APs; and
- Reinforced coordination between Member States and the Secretariat in their efforts to promote the conclusion of safeguards agreements and APs.

9. Following the guidance of the Policy-Making Organs and the Agency's updated plan of action, the Agency has continued to encourage and facilitate wider adherence to safeguards agreements and APs, and amendments to SQPs. The Agency held consultations with representatives from a number of Member and non-Member States in Addis Ababa, Bangkok, Geneva, New York and Vienna during the reporting period.

C. Implementation of Safeguards

C.1. Developing and Implementing State-Level Safeguards Approaches

10. General Conference resolution GC(61)/RES/12, *inter alia*, welcomed the clarifications and additional information provided in the *Supplementary Document to the Report on The Conceptualization and Development of Safeguards Implementation at the State Level (GOV/2013/38)* (document GOV/2014/41 and Corr.1), and noted the Secretariat's intention to keep the Board of Governors informed of progress made in the development and implementation of safeguards in the context of the State-level concept.

11. As of 30 June 2020, State-level safeguards approaches (SLAs) had been developed for 131 States with a comprehensive safeguards agreement in force¹⁷. These 131 States hold 97% of all nuclear material (by significant quantity) under Agency safeguards in States with a comprehensive safeguards agreement and include 67 States¹⁸ with a comprehensive safeguards agreement and an additional protocol in force

¹⁵ GC/(63)/RES/11, OP 17

¹⁶ The plan of action is available on the Agency's website at: <https://www.iaea.org/sites/default/files/19/09/sg-plan-of-action-2018-2019.pdf>.

¹⁷ GC/(63)/RES/11, OP 31

¹⁸ Albania, Andorra, Armenia, Australia, Austria, Bangladesh, Belgium, Botswana, Bulgaria, Burkina Faso, Canada, Chile, Croatia, Cuba, Czech Republic, Denmark, Ecuador, Estonia, Finland, Germany, Ghana, Greece, Holy See, Hungary, Iceland, Indonesia, Ireland, Italy, Jamaica, Japan, Kazakhstan, the Republic of Korea, Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Madagascar, Mali, Malta, Mauritius, Monaco, Montenegro, Netherlands, New Zealand, North Macedonia,

for which the broader conclusion has been drawn (of which 17 are States with an SQP); 37 States¹⁹ with a comprehensive safeguards agreement and an additional protocol in force for which the broader conclusion has yet to be drawn (of which 25 are States with an SQP); and 27 States²⁰ with a comprehensive safeguards agreement with an SQP in force but no additional protocol in force. Previously, an SLA was developed for one State²¹ with a voluntary offer agreement (VOA) and an additional protocol in force. As described in the Supplementary Document, in developing and implementing an SLA, consultations were held with the relevant State and/or regional authority, particularly on the implementation of in-field safeguards measures.

12. To further ensure consistency and non-discrimination in the implementation of SLAs, the Agency has continued to improve internal work practices taking into account experience gained and lessons learned in the development and implementation of SLAs for States under integrated safeguards²². In 2019, the Agency started a two-year project aimed at improving the development of SLAs using a structured approach which includes: further developing and testing internal procedures for analysing acquisition paths; standardizing the formulation and prioritization of technical objectives; and developing and testing performance targets. These enhanced procedures were tested internally for several States.

C.2. Dialogue with States on Safeguards Matters

13. The Secretariat has continued to engage in open and active dialogue with States on safeguards matters. The Secretariat in July 2019 held a technical meeting on innovative technologies to strengthen the effectiveness and improve the efficiency of Agency safeguards. In view of the working arrangements during the COVID-19 pandemic, the Agency reworked the yearly seminar on IAEA safeguards for diplomats from an in-person one day seminar at the VIC into an on-line format. The five-part modular webinar, to familiarize new Vienna-based diplomats with Agency safeguards, began on 22 June 2020 and covered the current context for IAEA safeguards; described the safeguards legal framework, including rights and obligations of States and the Agency; provided an overview of the core safeguards processes and their outcomes; and informed participants of the assistance available to, and provided by, States in the area of safeguards implementation.

Norway, Palau, Peru, Philippines, Poland, Portugal, Romania, Seychelles, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Tajikistan, Ukraine, United Republic of Tanzania, Uruguay, Uzbekistan and Viet Nam.

¹⁹ Afghanistan, Antigua and Barbuda, Azerbaijan, Bosnia and Herzegovina, Burundi, Cambodia, Central African Republic, Chad, Congo, Côte d'Ivoire, Cyprus, Democratic Republic of the Congo, Eswatini, Ethiopia, Fiji, Gabon, Gambia, Georgia, Guatemala, Kyrgyzstan, Libya, Malawi, Marshall Islands, Mongolia, Mozambique, Namibia, Niger, Nigeria, Republic of Moldova, Rwanda, Saint Kitts and Nevis, Senegal, Thailand, Togo, Turkmenistan, Uganda and Vanuatu.

²⁰ Barbados, Belize, Bhutan, the Plurinational State of Bolivia, Brunei Darussalam, Dominica, Grenada, Guyana, Kiribati, Lao People's Democratic Republic, Maldives, Myanmar, Nauru, Nepal, Papua New Guinea, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sierra Leone, Solomon Islands, Suriname, Tonga, Trinidad and Tobago, Tuvalu, Zambia and Zimbabwe.

²¹ United Kingdom.

²² GC/(63)/RES/11, OP 31

C.3. Strengthening Safeguards Implementation in the Field



A safeguards inspector verifies the enrichment of uranium

14. The Agency has continued to seek improvements to the effectiveness and efficiency of safeguards implementation in the field. These improvements apply to all stages of the nuclear fuel cycle (including facilities in the post-accident and post-operational phases), and include advances related to both safeguards equipment and approaches.

15. As an example of equipment-related improvement, the Agency has deployed two COMPUCEA (Combined Procedure for Uranium Concentration and Enrichment Assay) systems at two major sites in the Islamic Republic of Iran for *in situ* destructive assay of nuclear material in bulk form. The Agency and the Islamic Republic of Iran are also cooperating on the testing of the ABACC-Cristallini method for taking UF₆ samples for destructive analysis.

16. In the area of safeguards approaches, the Agency has implemented a dual containment and surveillance system at a spent fuel dry storage facility in Pakistan. A facility approach incorporating remote data transmission from surveillance cameras and radiation detectors was implemented to monitor the defueling of a fast reactor in Japan. The possible use of PGET to verify the discharged fuel was discussed with the facility operators and Japanese safeguards authorities.

17. Taking into account the increasing number of nuclear facilities that are reaching the end of their operating life cycle and being taken out of operation, the Agency is working with Member States to develop safeguards guidelines for facilities in the post-operational phase. These guidelines will include revised design information questionnaire (DIQ) templates that may be used for the provision of information related to decommissioning activities. In 2020, a meeting with Member States' experts was held to finalize the updated DIQ templates and guidelines. The safeguards guideline for facilities in the post-operational phase will provide implementation guidance to assist States when designing and implementing their decommissioning procedures to facilitate the implementation of safeguards throughout the post-operational life cycle phases. The new safeguards guidelines including the updated

DIQ templates and the DIQ completion guidelines are expected to be available to States by the end of 2020.

18. With respect to the decommissioning of Units 1-3 at the Chernobyl nuclear power plant, the Agency continued development of the safeguards approach for the transfer of spent fuel from wet storage to interim dry storage after conditioning. At the Interim Spent Fuel Dry Storage Facility (ISF-2) in Chernobyl, installed safeguards equipment at the conditioning facility and interim dry storage facility were running in cold test mode during 2019 and were ready for hot testing in mid-2020.

19. Post-accident facilities also present unique challenges to effective safeguards implementation. Regarding the damaged unit 4 at Chernobyl Unit 4, the Agency continued to develop an effective and efficient approach, including hardware, to safeguard the nuclear material contained in the new safe confinement installed over the damaged facility.

20. Nuclear material inaccessible for verification remains in damaged Units 1-3 at the Fukushima Daiichi site in Japan. Transfers of fuel assemblies from the spent fuel ponds of Unit 3 started in the first half of 2019 and continued through mid-2020, enabling the nuclear material to be re-verified by the Agency. Surveillance and neutron gamma monitoring systems installed at the site ensured that nuclear material cannot be removed from the damaged reactors without the Agency's knowledge. The data from these systems are also being transmitted remotely to the Agency's regional office in Tokyo, thereby increasing the efficiency of Agency monitoring activities. The Agency also conducted short notice inspections and complementary access at the site. While verification of removed intact nuclear fuel items continues, the Agency is developing a conceptual approach to safeguard the future planned removal of nuclear debris from the damaged Units 1-3.

21. The Agency continued to prepare, with Member States support, for the future application of safeguards to new types of facilities (e.g. geological repositories, spent fuel encapsulation plants, pyroprocessing facilities, small modular reactors and pebble bed modular reactors). These preparations included the consideration of safeguards measures in the design stages of nuclear facilities: evaluating safeguards concepts, investigating prospective safeguards technologies and equipment, and identifying safeguards measures and potential efficiencies through design modification early in the design stages of a facility. During the year, the interdepartmental working group on safeguards by design continued to foster knowledge sharing and enhanced cooperation within the Agency on this subject. In addition, early interaction with small modular reactor designers commenced, as part of Member States Support Programmes (MSSPs) tasks on safeguards by design.

22. The Agency and the Republic of Korea have continued close cooperation on planning for safeguards implementation at future pyroprocessing plants, including in the early design stages of the plants. The Agency has continued to work with China to develop safeguards approaches for the high-temperature gas-cooled pebble bed modular reactor, currently under construction, that was designated for the application of safeguards under China's VOA. A parallel task accepted by China under its support programme that will facilitate the consideration of safeguards-by-design for pebble bed modular reactors remains ongoing.

23. The Agency, in cooperation with the European Commission (EC), has finalized a plan regarding equipment infrastructure requirements and specifications for the installation of safeguards equipment at the encapsulation plant in Finland. The Agency also continues working on the equipment infrastructure requirement for the associated geological repository. A safeguards approach for the encapsulation plant and a geological repository in Finland is also under development, and the installation of safeguards equipment is expected to start in 2020.

24. An important contributor to the effectiveness and efficiency of safeguards implementation for future facilities is the engagement of stakeholders involved in planning and development. The Agency

contributed to the international assessment of the proliferation resistance of nuclear facilities through continued participation in the Agency's International Project on Innovative Reactors and Fuel Cycle (INPRO), and the Generation IV International Forum. In addition, the Agency continued to participate in the Safeguards and Security Working Group under the Joint Fuel Cycle Study launched by the Republic of Korea and the United States of America. The Agency continued to develop guidance documents aimed at enhancing the understanding of nuclear facility vendors and designers regarding safeguards needs, and encouraging the consideration of safeguards measures early in the design and construction of nuclear facilities. Since the last report two new guidance documents on reprocessing and enrichment facilities were published.

25. The Agency has continued to hold expert meetings on updating its Physical Model, which characterizes all elements of the nuclear fuel cycle and is used for safeguards planning, implementation and acquisition path analysis. In the second half of 2019, two meetings were held, covering two separate elements of the nuclear fuel cycle (uranium enrichment and reprocessing and recycling of irradiated fuel).

C.4. Information Technology

26. The Agency has identified and commenced the development of additional safeguards software capabilities, in line with the international standard for programme management. The new capabilities will allow for: a better management of incidents and problems related to safeguards equipment; a more comprehensive analysis of safeguards verification data; a smart document management system to improve the workflow of documents; and an enhanced review of the Agency's technical assistance activities.

27. The IAEA Safeguards IT systems was put to the test between 16 March and 1 July 2020 as the majority of Agency staff and contractors worked remotely over this period. The Department of Safeguards managed to successfully maintain continuity of operations throughout.

28. The Department of Safeguards started to develop a comprehensive integrated lifecycle management system for the responsible and sustainable management of its assets. Under the Integrated Lifecycle Management of Safeguards Assets (ILSA) project, the Department is preparing an asset management strategy to provide guidance and ensure consistency for managing the lifecycle of all safeguards assets, including IT equipment, equipment supporting in-field activities and analysis, and both internally developed and commercially off the shelf software. This initiative will enable the Department to enhance its foresight of the funding needs required to maintain, replace, and renew assets.

C.5. Information Analysis



Analysing a satellite imagery at IAEA Headquarters

29. In order to draw soundly-based safeguards conclusions, the Agency evaluates all safeguards relevant information, including declarations and reports submitted by States, data generated from its own verification activities in the field and at Agency Headquarters, and other safeguards relevant information available to it²³. The Agency has continued to improve the effectiveness and efficiency of its evaluation processes by drawing on an increased amount of information from verification activities performed at Agency Headquarters and in the field, including the results from non-destructive assay (NDA), destructive assay, environmental sample analyses and remotely transmitted data, as well as identifying new open sources of safeguards-relevant information, covering in particular a broader range of science and technology publications in multiple languages.

30. Throughout the reporting period, the Agency continued to improve processes and to enhance methodologies and tools, often with the assistance of new competence from experts or assistance in kind provided by Member States Support Programmes, in support of the preparation of in-field verification activities, the State evaluation process as well as the development of acquisition path analysis (APAs) and SLAs.

31. During the reporting period, the re-engineering of legacy software and databases have been completed and are now undergoing testing. The software and databases are related to the support provided by statistical analysis to safeguards core activities. These activities include estimates of detection probability, sampling plans, random inspection schemes, measurement verification data evaluation and estimates of material unaccounted for.

²³ GC/(63)/RES/11, OP 8

32. The Agency has continued to increase its use and integration of multi-sensors, and commercial and free satellite imagery to improve its ability to monitor nuclear facilities and sites in support of its safeguards activities, particularly for areas that are inaccessible for security or other reasons.

33. A number of Member States have continued to voluntarily provide the Agency with information concerning unfulfilled procurement enquiries for nuclear-related products. This has been used as an input in assessing the consistency of nuclear activities declared by States to the Agency.

C.6. Analytical Services



Secondary Ion Mass Spectrometer (SIMS) at the Environmental Sample Laboratory, Safeguards Analytical Services in Seibersdorf

34. The collection and analysis of nuclear material and environmental samples are essential for effective safeguards. The analysis of such samples is performed at the Agency's Safeguards Analytical Laboratories (SAL) in Seibersdorf, comprising the Nuclear Material Laboratory and the Environmental Sample Laboratory. Analyses are also performed at the other laboratories of the Agency's Network of Analytical Laboratories (NWAL).

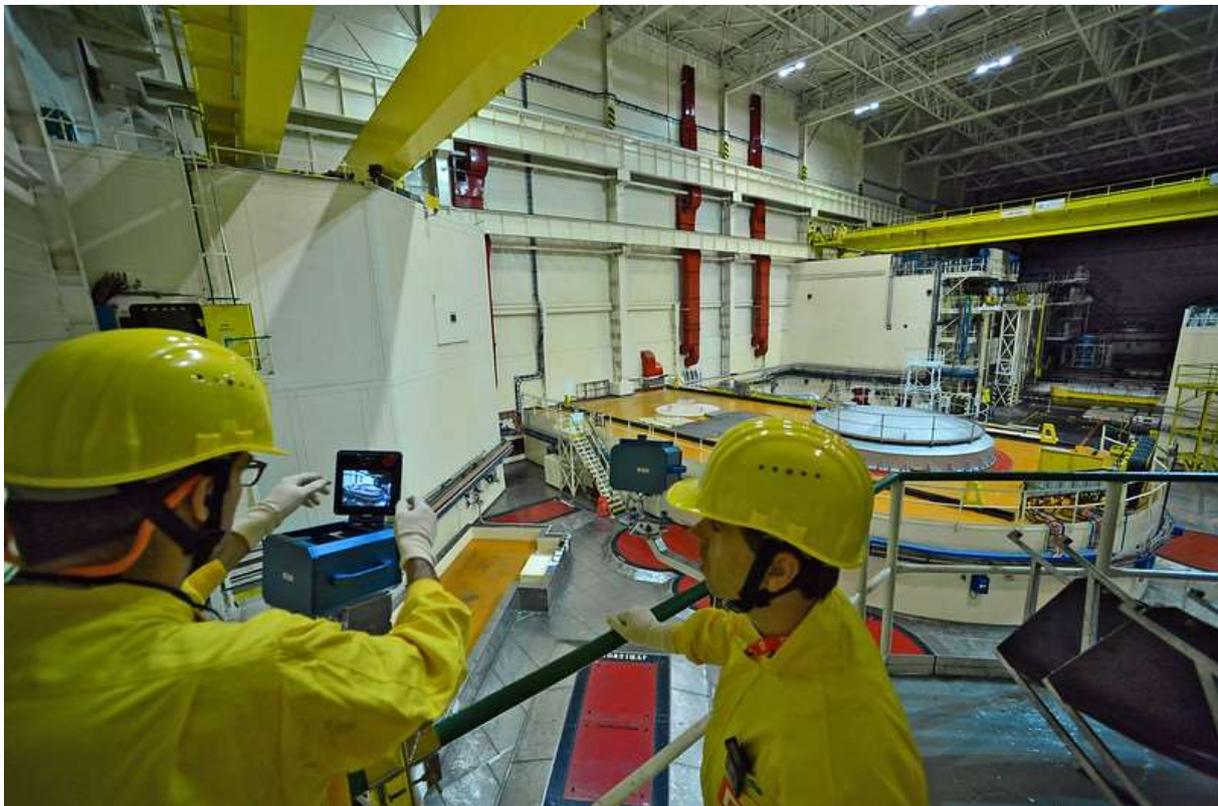
35. The NWAL currently consists of the Agency's SAL in Seibersdorf and 23 other qualified laboratories in ten Member States plus the EC. NWAL expansion continues, and laboratories in the following countries are undergoing qualification: Belgium, Canada and the Netherlands, for nuclear material analysis; Argentina, for heavy water analysis; and Germany, for reference material production.

36. The Agency's safeguards laboratories continued to enhance their analytical capabilities in cooperation with partner laboratories in the Member States through technical meetings, inter-laboratory comparisons, and subject-specific MSSP activities. During the reporting period, the Agency began to use analytical data on uranium particle age determination, currently provided by one NWAL member, in safeguards evaluations.

37. Prior to the COVID-19 pandemic the timeliness of environmental sample processing continued to improve, with further reductions in the time required for sample shipment, screening, and evaluation. During the Agency's remote working arrangements, the processing of any new nuclear material samples in SAL was suspended due to restrictions on the number of Agency staff permitted in the Seibersdorf laboratories. The large geometry secondary ion mass spectrometer (LG-SIMS) for environmental samples, however, continued operating. The laboratories continued to receive inspection samples for analysis and to dispatch samples to the network of analytical laboratories (NWAL).

38. The Agency also began a project aimed at the procurement, commissioning and calibration of a new Large Geometry Secondary Ion Mass Spectrometer (LG-SIMS) to sustain analysis capabilities in the area of particle analysis for uranium isotopes. This sustainment and replacement project, which is considered critical for the Agency to fulfil its verification responsibilities, is expected to be entirely funded through extrabudgetary contributions. The installation of the new machine is planned to be completed no sooner than the first quarter of 2023.

C.7. Equipment and Technology



Agency inspectors install a digital surveillance system

39. Verification activities rely heavily on the use of equipment, whether portable or installed at facilities. Remote data transmission continued to enhance efficiency by eliminating the need for data retrieval by inspectors at facilities and enabled early detection of any deterioration in the performance of data collection. Significant financial and human resources were dedicated to performance monitoring to ensure the reliability of the Agency's equipment.

40. During the reporting period, the reliability of digital surveillance systems, NDA systems, unattended monitoring systems and electronic seals has exceeded the target goal of 99% availability. This high level of infrastructure availability is achieved through robust design of the system architecture - implying redundancy and modularity - and implementation of preventive maintenance policies. The

Agency continued to develop and upgrade data automation and inspector review tools to help streamline equipment data collection and review processes.

41. In this reporting period a new surveillance review software, the Next Generation Surveillance Review (NGSR), was completed. It is anticipated to be authorized for safeguards use by the end of 2020. The modernization and development of NDA systems continued, in particular with the procurement of passive gamma emission tomography (PGET) systems for the verification of the integrity of spent fuel and irradiated items and the authorization of the Fast Neutron Coincidence Collar (FNCL), designed for the verification of fresh fuel assemblies.

42. The Agency continued to conduct acceptance testing, training, installation and maintenance with regard to safeguards equipment, including that authorized for joint use with State and/or regional authorities. Such cooperation also supported the field testing of new safeguards equipment, which is an important step in the process of authorizing such equipment for safeguards use. For example, the development of two new software applications, the MCA Reporting Tool (MRTS) and the SpectraLine Multipurpose Gamma-Spectrometric Software (SLGS) was completed and the functionality of the Integrated Review and Analysis Package (IRAP) software was enhanced. A new version of the Autonomous Navigation and Positioning System was also developed.

43. Within the framework of the sealing and containment modernization programme, the Agency continued to pursue implementation of new sealing technologies and to enhance their overall security. In the reporting period, the development of a new electronic seal with enhanced security features progressed significantly with field trials expected to start in the second half of 2020. A new Laser-Curtain Containment System was introduced, the implementation of which will allow for a more efficient sealing of a large group of objects, such as silos or spent fuel casks in a dry storage facility.

44. Technology foresight activities aim to identify and evaluate the potential application of emerging technologies for use in verification²⁴. Since the last report, the Agency has conducted evaluation and testing of several technologies that could support Agency safeguards implementation. For example, as a result of the “Cerenkov Challenge”, the next generation Cerenkov viewing device (XCVD) was developed from a proof-of-concept into an integrated hand-held instrument, able to process, record and display improved images of the Cerenkov glow emitted by spent fuel assemblies. Making full use of available technologies is necessary to ensure improvements in efficiency as demands on the Department of Safeguards continue to grow. Building on the success of previous technology challenges that provided highly effective means to trigger innovation, a new technical challenge was launched in 2019 to improve data processing algorithms for PGET.

45. Participation in regular multilateral planning meetings, involving technical teams, Operations, Facility Operators and State Authorities, has proved to be one of the keys for successful project implementation. This facilitates efficient development of technical project documentation which increases awareness of all parties of the implications related to safeguards equipment installations and as a basis for effectively implementing Safeguards by Design (SBD). In the reporting period, significant work in this area has been carried out for numerous facility projects in Canada, Finland, Kazakhstan, and Ukraine.

C.8. Evaluation of the Effectiveness of Safeguards Implementation

46. Internal evaluation of the effectiveness of safeguards implementation was performed through peer reviews of annual implementation plans and State evaluation reports. In the reporting period, several annual implementation plans were reviewed. In addition, the State evaluation of several other States was

²⁴ GC/(63)/RES/11, OP 32

peer reviewed by ad-hoc departmental teams. Preparatory work also commenced on expanding the scope of the reviews of annual implementation plans in the coming year. The scope of the reviews of annual implementation plans was expanded by introducing an independent review and approval by the Office of the Deputy Director General of all the annual plans to be implemented in the current year. This additional layer of internal evaluation is expected to further strengthen the effectiveness of safeguards implementation, as well as to increase the level of consistency and standardization across the Department.

C.9. Cooperation with, and Assistance to, State and Regional Authorities

47. The effectiveness and efficiency of Agency safeguards implementation depends, to a large extent, on the effectiveness of State and regional systems of accounting for and control of nuclear material (SSACs/RSACs) and on the level of cooperation between the State or regional authorities responsible for safeguards implementation (SRAs) and the Agency. SRAs need legislative and regulatory systems to be able to exercise the necessary oversight and control functions, as well as resources and technical capabilities commensurate with the size and complexity of the State's nuclear fuel cycle. Recognizing the challenges faced by some States in establishing an effective SSAC, the Agency continued to provide assistance to strengthen their technical capabilities to implement the requirements of their safeguards agreements and APs.

48. The IAEA SSAC Advisory Service (ISSAS) provides States, at their request, with advice and recommendations on the establishment and strengthening of their SSACs, based on an in-depth evaluation with respect to safeguards obligations, guidance and good practices. ISSAS missions provide recommendations for strengthening the regulatory, administrative and technical elements of the SSAC, and enhancing the cooperation with the Agency. Since last year's report, no ISSAS missions were requested.

49. The Agency has continued to provide training to personnel of SRAs as well as operators of facilities and locations outside facilities (LOFs) and staff of relevant stakeholders, such as customs authorities. Over the past reporting period, the Agency has conducted seven training courses at international, regional and national level. Four courses in the period have been postponed due to the situation resulting from the COVID-19 pandemic. The development of on-line learning modules aimed at complementing the Department of Safeguards in-person training was initiated.

50. One international SSAC course for newcomer countries was conducted in the Republic of Korea. One regional training course on the Additional Protocol was held in Indonesia, one regional training course for States with SQPs was held in Uganda²⁵, and for the first time, in collaboration with the United States Department of Energy, a regional workshop on Information Management for SSAC was held in Georgia.

51. Upon the request of Member States, three training courses were organized at the national level. These included national training courses on SSACs for Egypt, Mexico and the United Kingdom. The Agency also conducted short workshops for Member States related to safeguards implementation. In addition, in 2019, the Agency developed a new initiative to assist States to strengthen the effectiveness of SSAC/SRAs²⁶.

52. The Safeguards Traineeship Programme for young graduates and junior professionals began in February 2020. Six trainees were selected representing Eswatini, Ecuador, Ghana, Kyrgyzstan, Nepal,

²⁵ GC/(63)/RES/11, OP 10

²⁶ GC/(63)/RES/11, OP 34

and Togo. The Traineeship Programme has evolved to integrate additional modules in Vienna in order to address the COVID-19 health and safety-related travel restrictions.

53. The Agency continued to enhance the safeguards pages of its website, providing SRAs and others with access to publications as well as safeguards-related videos, guidance and reference documents, forms and templates.

54. The Agency has continued to promote its improved IT environment for States to prepare and submit reports and declarations to the Agency through the use of the Protocol Reporter version 3 software and the State Declarations Portal (SDP). The SDP substantially increased productivity by saving time and effort in communicating with States on matters relating to the implementation of safeguards and reducing manual data entry and transcription errors. However, a number of States continue to provide their declarations in a format that requires substantial manual data entry.

55. A number of States have taken actions to enhance safeguards implementation. Examples of such actions include: hosting regional and international training courses to raise awareness of Agency safeguards; providing the Agency with early design concepts to assist in developing safeguards approaches for emerging nuclear fuel cycle technologies; performing national inspections at facilities and LOFs; validating operator data and ensuring the quality of records, reports and declarations prior to submitting information to the Agency; making facilities available for training Agency staff and for Member State training; and providing experts to facilitate and lecture at workshops and training courses.

56. The Agency provided lecturers and conducted ‘table top’ exercises to support training courses organized by Member States. The Agency participated in the regional training course on the SSAC in Japan and in various national and regional workshops organized by the United States through the United States Department of Energy. Furthermore, safeguards related issues have been discussed with officials in Belarus and Egypt during the Agency-led Integrated Nuclear Infrastructure Review (INIR) missions.

57. In 2019, the Agency developed a new initiative to assist States to strengthen the effectiveness of SSAC/SRAs. The initiative focused on 19 States that were yet to provide their initial inventory report. Based on the experience gained in 2019, in 2020, the Agency will continue with its initiative that aims at strengthening and sustaining the effectiveness of SSAC/SRAs in States with at least one facility under Agency safeguards and that express an interest in participating. This will include the development of a comprehensive plan to address States’ needs to strengthen and sustain the effectiveness of their SSAC/SRAs, and monitor progress in close cooperation with each State involved. Costs associated with the implementation of this initiative will be secured mainly from extra-budgetary resources.

C.10. Safeguards Workforce

58. In May 2020, eight new inspectors began the Introductory Course on Agency Safeguards (ICAS 69). This introductory course includes modules on the legal framework for Agency safeguards; safeguards implementation and verification techniques, including NDA methods and containment and surveillance; radiation protection; Agency and State reporting; and negotiation and communication skills. The ICAS will conclude with an inspection exercise at a light water reactor and the presentation of a case study by the inspectors. Prior to the new inspectors’ arrival in Vienna, the Agency began to prepare them for their work by launching moderated on-line learning activities on the Agency’s learning management system.

59. Courses for safeguards staff continued to be offered on the full range of safeguards activities conducted in the field and at Agency Headquarters to develop the technical and behavioural knowledge and skills required for safeguards implementation. Overall, the training programme through March 2020 was implemented as planned, with additional training provided to support verification in the Islamic Republic of Iran, and to prepare the inspectorate for potential activities in the Democratic People’s

Republic of Korea (DPRK)²⁷. The COVID-19 pandemic has resulted in the postponement or cancellation of several classroom courses. The situation has resulted in the development of new initiatives to support delivery of knowledge and skills through online and blended learning which can provide increased access and complement in-person training.

60. The Agency continued to provide training for staff in the Department of Safeguards through a radiation protection course which is composed of an online component and a practical exercise. New training courses were also delivered, including an industrial safety course for inspectors, a refresher course on performing criticality checks at research reactors and critical assemblies, and a course on nuclear fuel cycle safeguards (for non-inspectors). Furthermore, new e-learning modules were launched on sample logistics, radiation protection, and the use of the electrically-cooled germanium system for NDA measurements. Additionally, as a result of a Department-wide training needs analysis, a new strategy has been developed to integrate training on the applications resulting from the MOSAIC project with departmental processes, resulting in a new series of courses.

61. In line with the Agency's policy to achieve gender parity in professional and higher categories by 2025, the Department of Safeguards is committed to supporting gender equality and is seeking to strengthen efforts to promote both gender balance in its staff and gender mainstreaming considerations in relevant programmatic activity. As of 31 December 2019, 35% of all regular staff members in the Department were female. In the Professional and higher categories, women represented 23% of the regular staff and 20% of the safeguards inspectors in the Divisions of Operations and the Office for Verification in Iran. Women in the Department also comprised 16% of senior positions at the Section Head level and above.

C.11. Quality Management

62. Throughout the reporting period, the Department of Safeguards continued to undertake activities to strengthen and improve its quality management system (QMS). The Department revised and updated a number of QMS policies and procedures and undertook efforts to strengthen the process approach and improve the awareness and overall effectiveness of the QMS. Two senior management meetings were convened during the reporting period for the specific purpose of assessing the ongoing effectiveness of the Department's QMS.

63. Process improvement activities continued to be performed to standardize process implementation including the initiation of a collaborative effort within the Department to create interactive web-based business process maps for the provision of equipment and technical services for in-field verification activities.

64. Specific actions were undertaken to further integrate risks and opportunities into QMS activities including the implementation of a risk-based internal quality audit programme and the use of the Department's condition reporting system for identifying and managing quality, radiological and industrial safety, and security events.

65. Ongoing training was undertaken to raise awareness of the QMS, including managing and controlling safeguards documents, the use of the condition report system, and the principles of continual process improvement.

66. The SAL in Seibersdorf maintained their certification to the ISO 9001 management system standard and the Equipment Radiation Monitoring Laboratory retained accreditation to the ISO 17025:2017 standard.

²⁷ GC/(63)/RES/11, OP 20

C.12. Organizational Resilience

67. The Department of Safeguards continued its efforts to ensure business continuity and disaster recovery to maintain the continuation of critical business processes and the availability of information during a disruptive event. During the year, the Safeguards Business Impact Analysis (BIA) was completed as part of the Agency's One BIA. As a result, the critical business processes of the Department of Safeguards were identified and the related internal and external dependencies were determined. The top priority critical process of the Department was assessed to be carrying out nuclear verification activities which includes prioritizing verification activities in the field and ensuring the availability of information and relevant equipment, the use of proper and secure communication channels, and the safe travel of staff.

68. In the reporting period, safeguards information security continued to be a priority for the Agency. In response to the increasing complexity in technology and changes in the types of threat, the Agency strengthened its holistic approach to security, which encompasses: information security; physical security; and business continuity and disaster recovery. Information security policy and governance have been greatly enhanced through the Information Security Management System (ISMS) project, which is enabling the Department of Safeguards to systematically manage the risks to the confidentiality, integrity and availability of safeguards information and assets²⁸.

69. In 2019, the Agency adopted a security control framework for the Department of Safeguards to focus its efforts on the most effective mitigation strategies while looking at ways to reduce costs. To strengthen performance management of IT security, key performance indicators for measuring critical IT operations areas were piloted. New operational procedures were developed to complement the departmental physical security management system software and thereby reduce the risk of software vulnerabilities.

70. The Department of Safeguards also continued to integrate an effective risk-based approach by increasing information security awareness. Since the last report, the Department refocused its mandatory security training to reflect the evolving threat landscape and maximize knowledge retention among trainees.

71. Finally, in December 2019, the Department completed its Safeguards IT High Availability project within time and budget. The project delivered a higher assurance of the reliability of the Department's IT network through decreased downtime and elimination of single points of failure.

C.13. Safeguards Reporting

72. The Director General reported on the implementation of safeguards and the safeguards conclusions for 2019 in *The Safeguards Implementation Report for 2019* (GOV/2020/9)²⁹, which also provided data on the numbers and types of facilities and LOFs under safeguards, and the inspection effort and related cost of safeguards implementation³⁰. At its June 2020 meeting, the Board of Governors took note of the report and authorized the release of the Safeguards Statement for 2019 and of the Background to the Safeguards Statement and Summary.

²⁸ GC/(63)/RES/11, OP 38

²⁹ The Safeguards Statement for 2019 and the Background to the Safeguards Statement and Summary of *The Safeguards Implementation Report for 2019* are published on the Agency's website at: <https://www.iaea.org/sites/default/files/20/06/statement-sir-2019.pdf>.

³⁰ GC/(63)/RES/11, OP 27, 30, 39

C.14. Programmatic Planning

73. The Secretariat carries out programmatic planning to ensure that safeguards implementation will continue to be both effective and efficient. This contributes towards addressing the increasing gap between workload and resources; anticipating and responding to changes and new demands; keeping up with technology and innovation; sustaining the safeguards workforce and institutional knowledge; enhancing organizational performance; and engaging with Member States and other stakeholders.

74. As part of its activities to monitor and prepare for changes, the Department organized and issued a report³¹ on its Emerging Technologies Workshop held in January 2020. The Agency continued to implement its *Research and Development Plan: Enhancing Capabilities for Nuclear Verification* (STR-385)³², which outlines the capabilities the Secretariat wishes to develop and for which Member State research and development support is required. The Agency also issued and began implementing the *Development and Implementation Support Programme for Nuclear Verification 2020-2021* (STR-393)³³. It held the biennial Safeguards MSSP Coordinators' Meeting in January 2020, generating substantive support for Agency safeguards, such as extrabudgetary funding, expertise, access to training facilities and in-kind donations.

³¹ The report *Emerging Technologies Workshop: Insights and Actionable Ideas for Key Safeguards Challenges* (STR-397) is published on the Agency's website at: <https://www.iaea.org/sites/default/files/20/06/emerging-tehnologies-workshop-290120.pdf>.

³² This report is published on the Agency's website at: <https://www.iaea.org/sites/default/files/18/09/sg-str-385-research-and-development-plan.pdf>.

³³ This report is published on the Agency's website at: <https://www.iaea.org/sites/default/files/20/01/d-and-s-programme-2020.pdf>.



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

www.iaea.org

International Atomic Energy Agency
PO Box 100, Vienna International Centre
1400 Vienna, Austria
Tel.: (+43-1) 2600-0
Fax: (+43-1) 2600-7
Email: Official.Mail@iaea.org