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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(68)/RES/12 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 69th regular session. This report responds to that request and updates the information in last year's report to the General Conference (document GC(68)/9).[1]

[1] This report covers the period between 1 July 2024 and 30 June 2025.

B. Safeguards Agreements and Additional Protocols

B.1 Conclusion and Entry into Force of Safeguards Agreements and Additional Protocols[2]

As of 30 June 2025,

191 States[3,4]
had safeguards agreements in force with the Agency,

of which
144 States

(including 138 States with CSAs)
also had APs in force.

2. Between 1 July 2024 and 30 June 2025, a comprehensive safeguards agreement (CSA) with a small quantities protocol (SQP) based on the revised standard text and an additional protocol (AP) entered into force for Timor-Leste. During this period, SQPs based on the original standard text were amended for Cyprus, Mongolia, Oman, Saint Vincent and the Grenadines, and Zambia, and an SQP based on the original standard text was rescinded for Saudi Arabia, in keeping with the Board of Governors' decision of September 2005 regarding such protocols. Additionally, an AP entered into force for Saint Vincent and the Grenadines and an AP was signed for Nauru. The Board of Governors approved CSAs with SQPs based on the revised standard text and APs for Equatorial Guinea and Somalia.

3. As of 30 June 2025, 191 States[3,4] had safeguards agreements in force with the Agency, 144 of which (including 138 States with CSAs) also had APs in force. Forty-seven States had yet to bring into force APs to their safeguards agreements.

4. As of 30 June 2025, 86 States[5] with CSAs had operative SQPs in force based on the revised standard text, and 13 States[6] had operative SQPs in force based on the original standard text.[7]

5. Three non-nuclear-weapon States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)[8] had yet to bring CSAs into force pursuant to Article III of the Treaty.

6. The latest status of safeguards agreements and APs is published on the Agency's website.[9]

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[2] GC(68)/RES/12, OP 17.

[3] And Taiwan, China.

[4] The designations employed and the presentation of material in this report, 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.

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

[6] This number does not include one operative SQP reproduced in INFCIRC/229.

[7] For States with a CSA in force with an operative SQP based on the original standard text, the Agency's ability to draw a credible and soundly-based annual safeguards conclusion is significantly affected. This is due, inter alia, to the fact that the original standard text of the SQP holds in abeyance the requirement for these States to provide to the Agency an initial report on all nuclear material as well as the Agency's right to perform verification activities in these States. In light of such limitations, and given the significant lapse of time since the decision of the Board of Governors in 2005 authorizing the Director General to conclude with each State with an SQP based on the original standard text an exchange of letters giving effect to the revised standardized text and the modified criteria, the Agency is no longer able to draw a safeguards conclusion for such States.

[8] 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.

[9] https://www.iaea.org/sites/default/files/20/01/sg-agreements-comprehensive-status.pdf

Between 1 July 2024 and 30 June 2025, SQPs based on the original standard text were amended or rescinded for

6 States

As of 30 June 2025,

86 States[5]

had operative SQPs in force based on the revised standard text, and

13 States[6]

had operative SQPs in force based on the original standard text.

B.2. Promotion and Assistance in the Conclusion of Safeguards Agreements and Additional Protocols[10]

7. 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*.[11] 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 the knowledge and 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.

8. Pursuant to the guidance of the Agency's 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 amendment and rescission of SQPs. During the reporting period, the Agency conducted a visit to Sierra Leone and participated in events held by an external partner for Brunei Darussalam, Guinea, Micronesia and the Solomon Islands. The Agency also held consultations with representatives from a number of Member and non-Member States in Geneva, New York and Vienna.

C. Implementation of Safeguards

C.1. Developing and Implementing State-Level Safeguards Approaches[12]

9. General Conference resolution GC(68)/RES/12 welcomed, inter alia, 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 – also known as the 'Supplementary Document') and noted the Secretariat's

[10] GC(68)/RES/12, OP 17 and 18.

[11] The plan of action is available on the Agency's website at: https://www.iaea.org/sites/default/files/24/09/sg-plan-of-action-1-july-2023-to-30-june-2024.pdf

[12] GC(68)/RES/12, OP 28, 31 and 32.

intention to keep the Board of Governors informed of progress made in the development and implementation of safeguards at the State level.[13]

10. The Agency has progressively developed and implemented State-level safeguards approaches (SLAs) as set out in GOV/2013/38 and its Supplementary Document (GOV/2014/41 and Corr.1). Based on the experience gained during implementation, in 2019 the Secretariat started a project focused on improving consistency in SLA development methodology for conducting acquisition path analyses (APA) and developing SLAs for States with a CSA and an AP in force for which the broader conclusion has been drawn. In 2023 the project was completed, and in 2024 the Department finalized its internal procedure for the development of SLAs for such States. The revised procedure enhanced consistency through, inter alia:

- Further standardization of the assessment, performed during APA, of States' nuclear fuel cycle and related technical capabilities;
- The establishment of acquisition path coverage goals;
- Further standardization of technical objectives;
- Setting performance targets for technical objectives; and
- New IT tools that support APA and SLA development and documentation.

11. The revised procedure is fully consistent with GOV/2013/38 and GOV/2014/41 and Corr. 1, has no impact on the existing rights and obligations of either States or the Agency, and does not involve any modification in the interpretation of existing rights and obligations.

12. Under the revised procedure, APA is performed and path coverage goals are determined for each State according to departmental standards. Technical objectives for the detection of individual steps on a path are assigned performance targets to meet these path coverage goals. The specific safeguards measures and activities provided for in a State's safeguards agreement that will be used to meet the performance targets, along with their frequency and intensity, are documented in the SLA.

13. The APA involves a technical assessment of the time it would take for a State to complete a path. In order to achieve an objective and consistent outcome of such an assessment, Member States' subject matter experts[14] assisted the Secretariat in defining a model undeclared nuclear facility with standardized times for processing a significant quantity of nuclear material, as well as in specifying the underlying industrial infrastructure, essential equipment, knowledge and related technology that would be needed to support the construction and operation of undeclared nuclear facilities in a State. In addition, the methodology established a basis for estimating the time needed to misuse declared facilities or locations outside facilities (LOFs) based on their relevant technical features. Implementation of these assessment methodologies is supported by newly developed IT tools that help to ensure the consistent application of APA.

14. These path lengths are categorized in broad terms as being 'near term' (two years or less), 'medium term' (between two and five years) or 'long term' (five years or more). Shorter paths and those that involve more sensitive materials receive more frequent and intensive verification activities. This is in accordance with the provision in paragraph 6(c) of INFCIRC/153 (Corrected) which provides for

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[13] GC(68)/RES/12, OP 24 and 28.

[14] Support provided by Belgium, Brazil, Canada, the Czech Republic, Finland, France, Germany, Hungary, the Kingdom of the Netherlands, the Russian Federation, Sweden, the United Kingdom, the United States of America, and the European Commission, under the MSSP 'Umbrella Task' 16/CCA-002 – Technical Assistance on Methodology and Guidance for Implementation of Safeguards at the State-Level.

"concentration of verification procedures on those stages in the nuclear fuel cycle involving the production, processing, use or storage of nuclear material from which nuclear weapons or other nuclear explosive devices could readily be made, and minimization of verification procedures in respect of other nuclear material, on condition that this does not hamper the Agency in applying safeguards under the Agreement".

15. Consequently, the SLA methodology sets path coverage goals according to this principle. Path coverage goals are based on the length of the path and the type of steps involved. Paths involving the diversion of more sensitive nuclear material (e.g., unirradiated plutonium and high enriched uranium), or misuse of sensitive nuclear fuel cycle processes (e.g., enrichment and reprocessing), and which can be implemented over a short time period (i.e., shorter paths) are assigned higher detection goals and thus a higher verification effort. Setting path coverage goals based on a State's technical capabilities in the nuclear fuel cycle, its safeguards agreement, and the nature of its safeguards conclusion allows the Secretariat to differentiate between States without discrimination.

16. Technical objectives are established for the detection of the steps included in the APA and are assigned performance targets in order to meet the path coverage goals described above. The Secretariat has developed internal instructions for setting performance targets associated to technical objectives taking into account the availability of effective safeguards measures and the efficiency of their implementation. By applying this guidance to all paths for the State, optimum performance targets are determined for meeting the path coverage goals. The complete set of performance targets for the technical objectives for a State will ensure that all paths are covered according to departmental standards.

17. Having defined the set of performance targets for the State, the State evaluation group (SEG)[15] then selects which specific safeguards measures and activities available under the safeguards agreement are to be used, how frequently and with what intensity (i.e., verification effort), in order to achieve those targets. During the course of SLA development, the Secretariat makes efforts to further optimize the approach through minimizing the frequency of verification activities, taking account of the various technical objectives at a given facility and its geographic proximity to, and relationship with, other facilities in the State. For efficiency purposes, it is possible to address multiple technical objectives during a single inspection or other in-field verification activity. This consideration is taken into account in order to optimize the frequency and intensity of different combinations of safeguards measures and activities.

18. Performance targets relating to undeclared steps of a path are addressed through a combination of in-field verification activities, particularly complementary access, and also by those performed at Agency Headquarters and regional offices. Such Agency Headquarters activities include ongoing State evaluation tasks, such as the collection, validation and analysis of safeguards relevant information. In addition, specific Agency Headquarters activities targeted at detecting any possible undeclared activities in relation to sensitive technologies related to the nuclear fuel cycle are identified, as necessary. A State's technical capabilities with respect to developing the key nuclear fuel cycle technologies of enrichment, reactors and reprocessing are also reassessed with a frequency specified by the performance targets.

19. Each SLA is developed by a SEG and subsequently reviewed by several levels of senior management in the Department of Safeguards and a departmental committee before being approved by the Deputy Director General for Safeguards.

20. Based on the refined methodology described above, by the end of 2023 the Agency had already developed or updated SLAs for 30 States with the broader conclusion. During the reporting period, the

[15] The SEG consists of staff members in the Department of Safeguards with the appropriate expertise to evaluate all safeguards relevant information for the State. The SEG also performs APA, develops the SLA and prepares an annual implementation plan for individual States. See the Supplementary Document, paragraphs 25 and 151.

Agency developed a new SLA for three States, and updated SLAs for an additional 12 States, all having a CSA and an AP in force and for which the broader conclusion has been drawn. This brings the total number of such States for which SLAs have been developed, or updated by applying the refined methodology, to 45. Implementing the revised procedure has produced consistent, well documented, and reproducible results.

21. Experience gained to date has demonstrated a very limited impact on the overall number of in-field safeguards activities. This was consistent with the need for safeguards implementation to remain within existing resource requirements for the Department of Safeguards. While there were shifts in the focus of safeguards activities within a State, for almost all States there was either no change or a reduction in the expected average number of annual in-field verification activities. In a few States, a limited increase in safeguards activities was required to meet performance targets. Greater use of both advanced technologies and improved randomization schemes is key to ensuring effective and efficient safeguards implementation.

22. Through the use of departmental acquisition path coverage goals, the refined methodology for SLAs ensures that the Secretariat is focusing its resources systematically on the most sensitive nuclear material and nuclear fuel cycle processes, while maintaining sufficient coverage of other paths, in a uniform manner from one State to another. As departmental instructions for setting technical objective performance targets take account of the cost-effectiveness of safeguards measures, opportunities for improvements in efficiency can be realized.

23. The Secretariat conducted informal consultations with 25 members of the Board of Governors and representatives of other interested Member States to explain the revised procedure and its application, and to obtain feedback on these efforts. These consultations were in addition to those held with the relevant State or regional authority responsible for safeguards implementation (SRA) during the course of developing and implementing an SLA, as described in the Supplementary Document.

24. In the immediate future, the Agency will continue to update/develop and implement SLAs for States with the broader conclusion using the revised procedure, and will continue working to adapt this refined methodology for States with a CSA and an AP but without the broader conclusion, and for States with a CSA but no AP in force. The application of the refined methodology for States with voluntary offer agreements and for States with safeguards agreements based on INFCIRC/66/Rev.2 will be assessed subsequently.

25. Recognizing that effective and efficient safeguards implementation is a cooperative effort between the Agency and a State, the Secretariat will continue to engage in open dialogue on safeguards matters with all States to further increase transparency and build confidence. In developing and implementing an SLA for a State, the Agency will continue to consult with the SRA, particularly on the implementation of in-field safeguards measures, and related practical arrangements will continue to be agreed in advance.

C.2. Dialogue with States on Safeguards Matters

26. The Secretariat has continued to engage in open and active dialogue with States on safeguards matters during the reporting period, as follows:[16]

[16] GC(68)/RES/12, OP 29.

- Presentations on the work of the Department at various seminars and briefings, including the IAEA Seminar for Diplomats in December 2024, the United Nations Disarmament Fellows in April 2025, and the Safeguards Seminar for Diplomats in May 2025;
- Four in-person side events and two in-person tours on the margins of the 68th IAEA General Conference. Topics included the role of diversity in the Department of Safeguards; COMPASS, an IAEA initiative to support States in building the capacity of their State systems of accounting for and control of nuclear material (SSACs) and SRAs; Department of Safeguards traineeships; the State Declarations Portal (SDP); safeguards equipment for non-destructive assay, containment and surveillance, and unattended monitoring; asset management; and monitoring equipment for radiation;
- Regular in-person tours of the Safeguards Analytical Laboratories in Seibersdorf, Austria, and tours of the safeguards equipment workshops and the Equipment Radiation Monitoring Laboratory (ERML), at Agency Headquarters;
- Presentations at various nuclear safeguards and non-proliferation events;
- Producing or updating infographics and brochures on the subjects of IAEA safeguards facts and figures in 2024; the additional protocol; safeguards in 2025; and the TechTrack initiative.

The Safeguards Traineeships side event at the 68th IAEA General Conference (Photo: IAEA)

C.3. Strengthening Safeguards Implementation in the Field

27. The Agency has continued to seek improvements to the effectiveness and efficiency of safeguards implementation in the field. These improvements include advances related to both safeguards equipment and safeguards approaches.

28. During the reporting period, new or improved site or facility-specific safeguards approaches/procedures were approved for:

- The application of a dual containment and surveillance system at a dry storage facility in Brazil;
- The routine use of remote data transmission at light-water reactors in the United Arab Emirates;
- The verification of spent fast reactor fuel at a facility in Japan;
- The verification of irradiated nuclear material transfers between two facilities in Canada.

29. The Agency continued to prepare, with Member States' support, for the future application of safeguards to new types of facilities, including geological repositories and encapsulation plants, pyroprocessing facilities, molten salt reactors, floating reactors, micro modular reactors and pebble bed modular reactors. These preparations, known as 'safeguards by design' (SBD), included 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. These efforts were conducted as part of several Member State Support Programme (MSSP) tasks, particularly on SBD for small modular reactors and other arrangements for engagement, as appropriate. The interdepartmental working group on SBD continued to foster knowledge sharing and enhanced cooperation within the Agency on this subject.

30. The Department of Safeguards continued to collaborate with the Departments of Nuclear Energy and Nuclear Safety and Security to develop guidance for Member States on the efficient implementation of safeguards. Notable outcomes of this work were a number of contributions on SBD to the 'International Conference on Small Modular Reactors and their Applications' held in October 2024.

31. MSSPs continued to support the Agency's efforts to update its guidance for safeguards implementation. Final drafting of guidelines for safeguards implementation at post-nuclear accident facilities and associated waste management facilities arising from three consultancy meetings conducted since October 2022 was completed during 2024. The guidelines are currently under review.

32. The Department of Safeguards continued its contribution to safeguards-related considerations of new nuclear facilities through engagement with the Agency's 'International Project on Innovative Reactors and Fuel Cycle' and the 'Generation IV International Forum'. The Department also continued its effort as a contributor to the new Agency-wide platform on small modular reactors and their applications, which was established to provide a 'one-stop' information resource for Member States.

33. The safeguards approach for the conditioning, encapsulation, and transfer from wet to dry storage of the spent fuel generated at the Chornobyl nuclear power plant continued to be implemented in accordance with the operational conditions of the site.

34. Transfers of spent fuel from the Rivne, Khmelnytskyy and South Ukraine nuclear power plants to the new centralized dry storage facility on the Chornobyl site, which had been suspended since 2022 due to the armed conflict in Ukraine, were resumed. The safeguards approach at the centralized dry storage facility relies on unattended monitoring with remote data transmission.

35. Based on the approved safeguards approach (including unattended monitoring equipment with remote data transmission), installation of the equipment infrastructure for the new safe confinement

facility enclosing the damaged reactor Unit 4 of the Chornobyl nuclear power plant is expected to be completed in 2026. The revised set of technical requirements is expected to be finalized in 2025. The installation of the associated technical infrastructure and the required safeguards equipment is envisioned to be completed in advance of the planned operation of the new safe confinement facility and, in any case, before the activities related to the stabilization or dismantling of the existing reactor shelter commence.

36. Finland and Sweden have each started to work towards the construction of an encapsulation plant and a geological repository (EPGR) for the disposal of spent fuel. The Agency's EPGR project coordinates the development of specific safeguards approaches for EPGRs, assesses verification methods, and identifies the needs for new safeguards equipment and techniques necessary for safeguarding these facilities to optimize safeguards measures at the time these facilities become operational.

37. In Finland, the geological repository is under construction. The drilling of deposition holes in the first deposition tunnel have been postponed and no excavation of additional deposition tunnels is expected before 2028. Construction of the encapsulation plant is nearing completion. The cold testing started in August 2024 and continues in 2025. The start of operation of the encapsulation plant is expected by early 2026. The Agency continued to verify the status of the EPGR through design information verification activities. The Agency continues to engage with the European Commission, the Radiation and Nuclear Safety Authority of Finland (STUK) and the facility operators of the EPGR and the spent fuel wet storage to develop and implement an effective safeguards approach for these facilities.

38. In Sweden, the licensing process for the construction and the operation of the EPGR continued. The final conceptual design of the encapsulation plant was provided in 2024, and the construction is expected to commence in 2028. The Agency continues to cooperate with the European Commission to define the requirements and specifications for the installation of safeguards equipment at the encapsulation plant.

39. Construction of the Japan Mixed-Oxide Fuel Fabrication Plant (J-MOX), which restarted in September 2022, continued throughout the reporting period. In August 2024, the State informed the Agency that construction of the main process building is now expected to be completed by the end of March 2028.

40. The Agency continued to deploy the necessary resources to have all of the required safeguards systems for nuclear material process monitoring in place and operational in accordance with the operator's schedule. The revised draft safeguards approach for J-MOX relies extensively on unattended measurement and monitoring systems with remote data transmission, and the Agency has continued to explore the use of novel technologies and possibilities for cost reduction. In addition, the Agency continued to conduct design information verification (DIV) activities during construction in the main process building.

41. Under the CANDU Equipment Based Approach (CEBA) project, the Agency and Canada continued their cooperation and made progress towards enhancing the technical safeguards measures implemented at operating CANDU nuclear reactors and their associated dry storage facilities. During the reporting period, the installation of Agency surveillance cameras was completed at one site, and the specifications for the installation of safeguards equipment at one of the three dry storage facilities were finalized. Discussions related to the installation of safeguards equipment at other facilities, as well as the associated project costs and funding are still ongoing.

42. In 2021, the United States of America requested the Agency to consider applying safeguards during the future disposition of plutonium into a long-term geological repository. The plutonium involved is currently subject to safeguards pursuant to the voluntary offer agreement (INFCIRC/288). The Agency

and the United States of America continued to make progress towards the implementation of the relevant safeguards approach and associated verification techniques, which include extensive reliance on surveillance and unattended monitoring systems. Additional surveillance and measurement equipment was installed and tested at the shipping facility.

C.4. Information Technology

43. The Agency continued its efforts to strengthen the IT capabilities of the Department of Safeguards by introducing new functionalities and enhancing existing systems. This work focused on seamless integration across applications, thereby reducing manual tasks through advanced automation. The Agency made substantial efforts in enhancing IT capabilities across key domains, including data analysis, services, collaboration with Member States, and verification activities. These advancements led to measurable increases in operational efficiency, allowing for better resource utilization and faster business processes.

44. In addition to improving core functionalities, the Agency prioritized the efforts to strengthen its IT capabilities based on their benefits, ensuring that new tools and platforms addressed the evolving needs of analysts, inspectors and States. By fostering stronger data-sharing frameworks and streamlining communication channels, the Agency reinforced its commitment to transparency and trust. These efforts also supported readiness for future challenges, making the Agency's IT infrastructure more adaptive and resilient in an increasingly complex global environment.

45. Regarding emerging technologies and innovation, the Department of Safeguards successfully introduced a Chatbot using an offline Large Language Model solution, tailored to meet the specific needs of the Department. This advanced tool enhances internal processes by providing secure, on-premises artificial intelligence capabilities while ensuring data privacy and compliance. It allows intelligent automation solutions for a streamlined administrative support and is a key enabler for increased efficiency.

46. Among the main IT innovations introduced and improved during the reporting period were:

- Enhancing the technical travel planning and reporting system by streamlining business processes through data integration across multiple systems. This effort significantly improved data quality, operational efficiency, and asset management. The deployment of a self-service kiosk in the Tokyo Regional Office empowered inspectors to independently update equipment custodianship, thus enhancing equipment management, minimizing the risk of loss, and ensuring accurate tracking of safeguards equipment;

- Upgrading the electronic seals working paper to improve verification reporting by enhancing stability, usability, and readiness for future demands;

- Delivering the inventory verification data processing feature — aimed to replace the existing legacy system — thus equipping inspectors with a more flexible and powerful tool to carry out their in-field activities effectively when receiving electronic data from operators;

- Upgrading the Destructive Analysis Sample Status System (DASST), offering a robust and maintainable solution;

- Modernizing the State questionnaire, a data collection tool supporting the State evaluation process. This user-friendly solution, replacing an outdated system, assists with the assessment of the performance of SSACs/SRAs, and it helps to identify specific areas where the Department can provide assistance to enhance their effectiveness and efficiency;

- Implementing the first prototype for Near Real Time System, in collaboration with the European Commission, to support verification of the EPGR in Finland;
- Introducing automation and templates for better document handling and implementation of procedural requirements. These enhancements improved efficiency and consistency in developing SLAs and APAs;
- Streamlining the incoming correspondence process through the SDP by implementing a flexible routing process.

C.5. Information Analysis

47. The analysis of safeguards relevant information is an essential part of evaluating States' nuclear activities and drawing safeguards conclusions. In drawing such conclusions, the Agency analyses the consistency of State declarations and compares them with the results of Agency verification activities and other safeguards relevant information available to it. In support of this process, the Agency draws on an increasing amount of information from verification activities performed at Agency Headquarters and in the field, including the results from non-destructive assay (NDA), destructive analysis (DA), environmental sampling (ES) analysis and remotely-monitored equipment. The Agency also draws on a diverse range of other sources of safeguards relevant information, including commercial satellite imagery and trade information. During the reporting period, the Agency continued to identify new safeguards relevant open sources of information, improve processes and enhance methodologies and tools for information collection and analysis. The continued development of innovative technologies aimed at supporting analysts in relation to the prioritization of safeguards relevant information identified in open sources yielded gains in efficiency and effectiveness. As part of these process enhancements, the Department introduced an innovative approach based on intelligent document processing to assist with the processing of hardcopies of declared information, improving efficiency in manual data entry tasks.

48. Substantial adjustments continued to be made to a number of processes and workflows related to information analysis activities. These adjustments, including organizational measures, enhanced IT support and database modifications, allowing evaluators and analysts to increase the number of deliverables. Throughout the reporting period, information analysis by Agency staff continued; the processing of State reports and declarations and associated feedback were performed in accordance with the Agency's obligations; the evaluation of nuclear material balances and the evaluation of environmental sample analysis results were maintained at levels required to support the increasing demand; and the Agency continued to collect, process and evaluate other safeguards relevant information.

49. To continually improve the quality of the information on which it relies, the Agency monitored the performance of laboratories and measurement systems and organized international technical meetings, training and workshops for various States on nuclear material accounting, including measurement data analysis, statistical methodologies and material balance evaluation concepts. The results of the monitoring activities were included in yearly departmental assessments of measurement quality.

50. Material balance evaluation reports are prepared routinely by the Agency for all nuclear material bulk handling facilities with an inventory or throughput of more than one significant quantity of nuclear material and, upon request, for other cases. The objectives of material balance evaluation are to evaluate the consistency of State declarations, and their agreement with Agency verification, through the processing, reconciliation and statistical analysis of NDA and DA results. This provides the basis for the Secretariat's findings on the non-diversion of declared nuclear material at bulk handling facilities.

51. The Agency continued to extend its sources of safeguards relevant information and associated methodologies, while enhancing dedicated tools, including those aimed at increasing the number of open-source information items collected automatically, validated by a safeguards analyst, and assessed as safeguards relevant. Progress was made, inter alia, in the area of using machine learning for more efficient collection and processing of information. Processes were also adjusted to enhance and expand the production of continuous monitoring alerts.

52. The Agency continued to use cutting edge earth observation technology and data services, including online streaming of satellite imagery, synthetic aperture radar sensors and satellites with a high revisit rate. These services enhance the Agency's capabilities in this area, including, inter alia, the possibility for the Agency to select directly from the provider's online catalogue the imagery most relevant to support the State evaluation process.

C.6. Analytical Services

53. The Agency collects, analyses and evaluates nuclear material and environmental samples. Nuclear material samples are used for material balance evaluation to verify State accounting reports, or for material characterization purposes. Environmental samples are used to detect possible indications of undeclared nuclear material or activities.

54. Environmental and nuclear material samples collected by safeguards inspectors are analysed by the Agency's Safeguards Analytical Laboratory (SAL) in Seibersdorf — consisting of the Nuclear Material Laboratory (NML) and the Environmental Sample Laboratory (ESL) — and other members of the Network of Analytical Laboratories (NWAL). The NWAL includes 26 qualified laboratories in Australia, Brazil, Canada, China, the Czech Republic, France, Germany, Hungary, Japan, the Republic of Korea, the Russian Federation, the United Kingdom, the United States of America, and the European Commission. In addition, the Agency jointly operates the On-Site Laboratory (OSL) in Rokkasho, Japan, for analysis of nuclear material samples collected at this site.

55. The Agency also provides logistical support for the collection, transport and analysis of nuclear material and environmental samples. Key performance indicators are used to monitor all stages of the sample collection, transport and analysis process in order to identify potential problems and make improvements in timeliness. Moreover, the Agency administers a rigorous quality control programme, which includes regular inter-laboratory comparison exercises covering the major safeguards analytical techniques, to confirm the quality of analytical results across the NWAL as well as other laboratories in Member States.

56. MSSPs provided reference materials and support to advance analytical techniques and also contributed to cooperation projects in support of the Agency's quality control effort. Moreover, the Agency's ESL, as well as other members of the NWAL, continued to develop uranium particle age determination capabilities. In-field verification activities were also continued for the 'ABACC-Cristallini UF_6 Sampling Method' in three States.

Environmental sample analysis at the Agency's Safeguards Analytical Laboratory (SAL)
(Photo: IAEA)

C.7. Equipment and Technology

57. The Agency continued to provide uninterrupted technical support and equipment for safeguards verification activities. Throughout the reporting period, all departmental requests for safeguards equipment and personal protective equipment (PPE) to be used by Agency inspectors and technical staff when conducting safeguards activities in the field were processed and fulfilled.

58. The Agency's effort to ensure the personal protection of all Agency staff on duty travel at inspected facilities and other safeguarded locations continued to result in the distribution of a large amount of PPE.

59. The Agency continued to deliver technical assistance for activities in the field, and conducted the scheduled field technical work necessary to maintain the required performance of the deployed safeguards equipment.

60. The Agency's investment in resources for enhancing data analysis, remote data collection consolidation, unattended monitoring systems (UMS), and containment and surveillance systems applied in the field continued to play a vital role in maintaining continuity of knowledge on nuclear material and essential equipment at facilities where physical access to Agency inspectors was impacted, particularly in Ukraine. During the reporting period, the reliability of digital surveillance systems, NDA

systems, UMS and electronic seals used in the field exceeded of 99.9% availability.[17] This high level of infrastructure availability has been maintained over the past years through robust safeguards system architecture — implying redundancy and modularity — and implementation of preventive maintenance policies. The performance of these systems contributed significantly to the attainment of Agency safeguards objectives for the reporting period.

61. Remote data transmission capability was used for the asset inventory verification of Agency safeguards systems installed in the field that are remotely connected to Agency Headquarters, thus reducing the inspectors' effort required to perform the inventory of Agency assets in the field.

62. Cooperation with SRAs provided the Agency with resources in the area of system design, data security and maintenance of safeguards equipment, including equipment authorized for joint use. During the reporting period, support provided by SRAs included:

- The provision of surveillance cameras and associated hardware for installation and maintenance of joint-use safeguards equipment;
- The development of software for the review and the analysis of data collected in the field.

63. Two new software modules were launched as part of the integrated scheduling tool for safeguards technical in-field activities. The electronic workplan streamlines the preparation of the technical travel supporting verification activities, providing integrated access for those involved to the asset management data related to the life cycle of equipment. The new modules increase the efficiency of the cross-divisional preparation of such travel and ensure all deployed safeguards systems are accurately reported in a timely manner.

64. The ERML provided uninterrupted radiation monitoring of items returned from verification activities in the field, including components of safeguards systems, seals, and environmental samples.

65. During the reporting period, NDA system capabilities were expanded by the following:

- The development of the hardware for next generation handheld gamma spectrometric device was completed and a contract was awarded for the production of this device. A new version of the software application for this device was also delivered under the German MSSP;
- The Robotized Cherenkov Viewing Device (RCVD) was authorized for the verification of spent fuel in interim underwater storages. The partly autonomous system enhances the accuracy of the verification while reducing the attendance time required to perform the activity and, therefore, the radiation exposure of the staff involved. The RCVD also provides a solution for the safeguards verification of covered spent fuel ponds;
- COMPUCEA continues to be used to determine the assay and enrichment of a UF_6 process and product samples taken from enrichment plants. This enables the Agency to confirm the reliability and efficiency of the system and enhances the capability for the timely detection of undeclared production or processing of nuclear material, in particular for highly enriched UF_6, by eliminating the constraints associated with shipment of samples.

[17] Defined as (1 - system failures/total number of systems uses).

Safeguards staff deploying Robotized Cherenkov Viewing Device (RCVD) (Photo: IAEA)

66. The Agency has almost completed the transition to cameras based on DCM-C5/DCM-A1 by replacing the camera systems that are reaching their end-of-life cycle.

67. Deep-learning-based analysis of surveillance images was further developed throughout the reporting period and successfully authorized at seven facilities in Canada and validated for one facility in Japan. This new technology provides a substantial reduction in the time spent by Agency inspectors to perform surveillance review. Deep-learning-based analysis of surveillance images is already integrated in the next generation surveillance review tool. Supported by the European Commission, the Next Generation Model Training (NGMT) tool will be integrated into the Next Generation Surveillance Review (NGSR) platform to add a new object detection algorithm that is complementary to the Agency's object detection technique.

68. Maintaining continuity of knowledge through containment and sealing of nuclear material and critical equipment components remains one of the most important elements of the Agency's verification activities.

69. The new Field Verifiable Passive Seal (FVPS) continues to gradually replace the historical passive seal (E-CAP), providing inspectors with the possibility to verify in-situ the seal integrity, thus reducing the need to return the seals to Agency Headquarters for verification.

70. The Active Universal Asymmetric Seal (AUAS) has started to replace the Electronic Optical Sealing System (EOSS) and has already been deployed in eight facilities in four States. In 2024, the design of the wireless version of the AUAS was finalized.

71. In 2024, the Laser Mapping for Containment Verification (LMCV) system was used by inspectors to verify spent fuel dry storage casks in Canada. The LMCV also continued to be tested in a storage facility in Romania, and it is now available for verification activities.

72. The Laser Curtain for Containment (LCCT) system provides a laser-based technology to maintain continuity of knowledge on nuclear material in storage by detecting intrusions into defined containment areas, thus providing an efficient alternative to individual cask sealing. In 2024, a new LCCT system was installed at a facility in Finland. By the end of 2024, LCCT systems were installed at five facilities in four States. Moreover, field testing of the LCCT was completed at one spent fuel storage in Germany.

73. During the reporting period, the installed unattended monitoring capability was maintained and the following developments were made:

- Four Advanced Material Accountancy Glove Box (AMGB) systems were manufactured, tested and prepared for shipment and installation at the mixed oxide (MOX) fuel fabrication plant in Japan. AMGB systems are built to perform partial defect measurements of MOX fuel in a variety of physical forms throughout the fuel fabrication process. The other systems designed for the safeguards verification activities at the MOX fuel fabrication plant in Japan are in the final stage of development;
- An unattended cylinder verification system for the determination of uranium enrichment and the mass of U-235 in cylinders containing the UF6 feed, tails or product material at gas centrifuge enrichment plants was transferred to the Agency under the United States of America's MSSP;
- Several new UMS components, such as the unattended multichannel analyser, the time-domain reflectometry system, and the unattended current monitor module were developed, and are undergoing performance tests.
- The Unattended Passive Gamma Emission Tomography (UGET) system is undergoing final development prior to authorization. This includes software optimization to ensure unattended and reliable operation under all anticipated circumstances.

74. Remote data transmission (RDT) is the capability to collect data at Agency Headquarters or regional offices from unattended safeguards systems installed in facilities. The use of RDT enables greater verification efficiency by relieving inspectors from the task of collecting data at facilities, and allows early detection of any deterioration in systems' performance.

75. Over the past years, the RDT infrastructure has evolved to provide more secure, reliable and efficient data collection and transmission from unattended safeguards systems. This result was achieved through technical enhancements, including direct polling of the data from collection modules, such as cameras, radiation sensors and collection computers, to the extent possible.

76. The Agency continued to further develop the automation of data processing and inspector review systems to help streamline equipment data collection and to increase the efficiency of the data review process. During the reporting period:

- The Integrated Review and Analysis Package (IRAP), jointly developed with the European Commission, was authorized for use in more than 20 additional facilities.
- The development of the Near Real Time System (NRTS), an automated extension of IRAP which provides increased efficiency in the data analysis process, continued for the EPGR at Onkalo, Finland. Moreover, a new NRTS is being developed for two facilities in Japan.

77. The Agency in close cooperation with MSSPs continued to identify and evaluate emerging technologies that could improve the efficiency and the effectiveness of safeguards instrumentation. This activity was performed under the umbrella of instrumentation technology foresight activities. During the reporting period:

- The RCVD was tested at several nuclear facilities with the support provided by the Swedish and Finnish MSSPs. As a result, the RCVD was authorized for partial defect verification of spent fuel, and it was used to verify spent fuel in ponds at several facilities;
- Under the Australian MSSP, new computer vision software modules were developed to enhance the autonomous operation of the RCVD;
- The use of muon imaging as a new technique to safeguard geological repositories continued to be assessed via computer simulations, in a joint effort supported by a number of MSSPs;
- In collaboration with the European Commission MSSP, LCCTv3 is currently in design and development. It represents a complete overhaul, both in hardware and software, leveraging the experience gained with LCCTv2;

At the end of June 2025, the Agency had approximately

55 600

active items registered in the safeguards asset registry

These items cost the Agency over

€259 million

and are deployed to support safeguards activities in

59 States[3]

C.8. Asset Management

78. Under the Integrated Lifecycle Management of Safeguards Assets (ILSA) project, the Department has created an asset management strategy to provide guidance and ensure consistency for managing the lifecycle of all safeguards assets, including IT equipment, safeguards equipment supporting in-field activities, laboratory equipment and software. Moreover, through the ILSA project, the use of estimating the whole-life costs of owning assets has been promoted and reinforced within the Department of Safeguards.

79. Leveraging the successes of the safeguards asset management system, the Department of Safeguards also supported the Department of Management to develop an asset management plan for the Agency's buildings and building systems at Seibersdorf. This plan resulted in a comprehensive inventory of Agency infrastructure at the Seibersdorf site, including a risk assessment and replacement forecast.

80. At the end of June 2025, the Department of Safeguards had approximately 55 600 active items registered in the safeguards asset registry, SEQUOIA. These items cost the Department over €259 million and are deployed to support safeguards implementation activities both at Agency Headquarters and in 59 States[3]. In addition to active items listed within SEQUOIA, the total value of departmental assets was revised upward to €313 million with the inclusion of infrastructure assets. The value of these infrastructure assets was based on the findings of the Seibersdorf infrastructure asset management plan.

81. The ILSA project continued the practice of an annual review of the costs, operational lifetime, and other key parameters to improve the Department's ability to plan for asset replacements. While the total funding needs for departmental assets are dynamic, the Department continues to foresee the forecasted financial requirements to replace the current suite of assets to be higher than the historical contributions starting in the late 2020s.

82. During the reporting period, aside from creating an asset management plan for the Seibersdorf site, the Department of Safeguards identified several areas for improvement that are expected to significantly

enhance the asset management system, capabilities, and competence. For example, updating the Agency-wide Information System for Programme Support (AIPS) Fixed Assets module for the management and maintenance of infrastructure assets, and reducing unverified assets. The Department is also enhancing quantitative project planning, documenting its asset management system, and implementing the IAEA Risk Management Framework to better manage its assets. These initiatives are part of the Department's ongoing efforts to improve its asset management capabilities and ensure compliance with ISO 55001 standards.

83. The Department will continue to improve its asset management system to ensure that it obtains the maximum value from its assets and provide strong quantitative justification should additional funding be required.

C.9 Evaluation of the Effectiveness of Safeguards Implementation

84. Effectiveness evaluation is a process involving every step of safeguards implementation to assess the extent to which safeguards objectives were attained by verification activities conducted in the field and at Agency Headquarters. Effectiveness evaluation of safeguards implementation is based on internal documents, such as the approved safeguards approaches and other related safeguards documentation, which are reviewed by departmental committees and safeguards evaluators.

85. During the reporting period, internal evaluation of the effectiveness of safeguards implementation was performed through departmental reviews of annual implementation plans and State evaluation reports.

86. The annual implementation plans approved at the beginning of the year are reviewed to assure that safeguards activities conducted in the field and at Agency Headquarters are planned to a level sufficient to achieve the safeguards objectives for the year. Afterwards, the annual implementation plans are reviewed to assure that planned safeguards activities were successfully conducted and, whenever safeguards implementation issues were encountered, actions related to their resolution were properly taken.

87. State evaluation reports are regularly reviewed by inter-departmental committees. As an additional review mechanism, every year ad hoc departmental teams are appointed by the Deputy Director General to peer review the State evaluation for a selected number of States.

88. Results from effectiveness evaluation activities are recorded and reported to senior management within the Department, identifying good practices and areas for improvement, and highlighting recommended actions.

C.10. Cooperation with, and assistance to, SRAs[18]

89. The effectiveness and efficiency of Agency safeguards depend, to a large extent, on the effectiveness of SSACs and regional systems of accounting for and control of nuclear material (RSACs), and on the level of cooperation between SRAs and the Agency.

90. Actions that contributed to the enhancement of the effectiveness and efficiency of Agency safeguards implementation were undertaken by a number of States, within the framework of existing or

[18] GC(68)/RES/12, OP 11.

newly launched initiatives, supported by the in-kind and financial contributions of a number of Member States, and the European Commission.

91. During the reporting period, the Agency delivered a full programme of in-person and online training courses and webinars. The Agency conducted over 20 training events for personnel responsible for overseeing and implementing SSACs and RSACs. These activities, comprising a mix of in-person and virtual courses as well as scientific visits, allowed the Agency to train more than 358 experts from 147 States on safeguards-related topics. A significant highlight was the inaugural Interregional Workshop on Enhancing Safeguards Infrastructure for States Embarking on Nuclear Power Programmes held in Finland, as well as the first ever virtual National Training Course on Material Balance Evaluation tailored to a Member State.

92. The Agency also continued to host and expand its offerings on CLP4NET,[19] a platform for e-learning open to all with a NUCLEUS account. During the reporting period, more than 3100 new users registered on CLP4NET, bringing the total number of registered users to over 14 800. The platform provides access to a password-protected virtual classroom for participants through which the electronic version of instructional materials, including Agency safeguards-related guidance documents, can easily be downloaded. The topics covered during these sessions included legal and regulatory instruments, safeguards implementation during decommissioning of facilities, safeguards by design and COMPASS. The past recordings are also available on the online platform.

93. In January 2024, following the completion of the pilot phase in 2023, the Agency initiated a new implementation cycle of COMPASS in four selected States.[20] During the reporting period, a total of 20 activities were delivered, including two joint reviews of safeguards regulations, two national training courses, and one mock inspection. As of 30 June 2025, COMPASS implementation is supported by 18 partners.[21]

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[19] Available at: https://elearning.iaea.org

[20] Bangladesh; Plurinational State of Bolivia; Cameroon and Ghana.

[21] Argentina, Australia, Belgium, Canada, Czech Republic, European Commission, Finland, France, Germany, Hungary, Japan, Russian Federation, Singapore, Spain, Sweden, United Arab Emirates, United Kingdom and the United States.

COMPASS participants during training exercise at Research Centre Řež, Czech Republic (Photo: IAEA)

94. In 2024, the Agency also contributed to the Specializing Master course on nuclear safeguards under the European Safeguards Training and Education (SaTE) project through the provision of lectures and workshops in safeguards implementation. The course, extending into 2026, is organized by the Politecnico di Milano and the European Nuclear Education Network, in collaboration with the European Joint Research Centre.

95. Beyond COMPASS and training dedicated to strengthening the effectiveness of SSACs/SRAs, the Agency undertakes other support activities and initiatives in cooperation with SRAs to help strengthen safeguards implementation. During the reporting period:

- Agency experts participated in 18 events sponsored by the International Nuclear Safeguards and Engagement Programme (INSEP) of the United States of America, Department of Energy and two Agency experts participated in regional events hosted by STUK and the African Commission on Nuclear Energy (AFCONE) within the framework of their programme entitled Uplifting Nuclear Safeguards in Africa.
- The Agency conducted a two-day workshop in conjunction with the Asia Pacific Safeguards Network to strengthen safeguards implementation, supported by Australia, Japan and the United States of America.
- The Agency continued discussions with the European Commission and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) aimed at strengthening cooperation and enhancing the effectiveness and efficiency of safeguards implementation in the relevant States.

- An Agency task force with Japan continued to address the long-term verification challenges at the Fukushima Daiichi site.

96. The Agency offers IAEA Safeguards and SSAC Advisory Service (ISSAS) missions to States, at their request, to provide them with advice and recommendations on the establishment and strengthening of SSACs. ISSAS missions are also conducted in the context of COMPASS to assess the individual safeguards needs of the participating States. Between 1 July 2024 and 30 June 2025, ISSAS missions were conducted in the Plurinational State of Bolivia and Cameroon, respectively, based on the ISSAS Guidelines, IAEA Service Series 13.[22]

97. A collaborative effort between the Departments of Nuclear Energy, Technical Cooperation, and Safeguards resulted in the organization and implementation of the Inter-Regional Workshop on Enhancing Safeguards Infrastructure for States embarking on a nuclear power programme, held in December 2024 in Vantaa, Finland.

98. The Agency continued to expand and promote the use of the SDP, a web-based secure system that supports communication exchange with SRAs. In addition to providing a faster, effective and more secure way to communicate with SRAs, the SDP allows for better integration with other safeguards applications and for more efficient analysis of the information received. Data security is a key feature of the SDP, which uses multiple reinforcing security layers to guarantee the confidentiality of communications between the Agency and SRAs. To enhance institutional memory, the SDP also offers a digital historical log of these communication exchanges.

99. Since its launch in 2017, the SDP has become a widely used communication portal that has gradually expanded its scope to handle different types of submissions, including nuclear material accounting reports, declarations under the AP and design information questionnaires (DIQs). During 2024, new types of submissions were provided via SDP to improve categorization and information management, including the possibility for States to respond to Agency communications based on the subject matter. By the end of June 2025, 127 States[3], the European Commission and ABACC had joined the SDP. The SDP has also been progressively used by the Agency to send out communications to SRAs, including statements, requests, acknowledgement letters, and summary of nuclear material accountancy reports and AP declarations. Both incoming SRA submissions and outgoing Agency communications have seen a steady growth since 2017.

C.11. Safeguards Workforce

100. During the reporting period, the Agency conducted 47 distinct safeguards staff training courses. As some were held more than once, a total of 78 offerings were provided overall, of which 34 were held outside Vienna, helping develop core and functional competencies for safeguards inspectors, analysts and other staff.

101. The Introductory Course on Agency Safeguards (ICAS), a six-month course consisting of ten modules, was completed by 11 new inspectors, and three comprehensive inspection exercises were held.[23] A new ICAS commenced in March 2025 for 11 inspectors.

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[22] 'IAEA Safeguards and SSAC Advisory Service (ISSAS) Guidelines' is available at: https://www.iaea.org/publications/14964/iaea-safeguards-and-ssac-advisory-service-issas-guidelines

[23] The 10-module ICAS is counted as one course.

The current Introductory Course on Agency Safeguards (ICAS) cohort (Photo: IAEA)

102. Between 1 July 2024 and 30 June 2025, 34 course offerings were held outside Agency Headquarters, mainly at Member States' nuclear facilities. Courses held at nuclear facilities are designed to enhance practical competencies for safeguards implementation in the field. They enable effective and integrated training of safeguards staff in a realistic environment. In particular they improve inspectors' ability to prepare for, conduct and report on inspection, design information verification and complementary access. These courses rely heavily on the provision of facilities and human resources by supporting Member States.

103. Courses held at Agency Headquarters aim to develop skills for analysing safeguards relevant information using different techniques, including collaborative analysis tools and application to State evaluation.

104. As part of the systematic approach to training, needs analysis, training design and development and effectiveness evaluation are an integral part of the training cycle. A new safeguards induction programme was developed and implemented, addressing the needs of the new hires into the Department of Safeguards.

105. Following a training needs analysis on industrial health and safety, the Agency continues to seek the support of Member States to help design and develop a basic industrial safety module which includes hazard recognition, human performance and knowledge transfer from mentors.

106. The Agency has over 60 active training-related MSSP tasks and continues to engage with MSSPs in the development of training methodologies and tools, as well as in the conduct of courses both at Agency Headquarters and at nuclear facilities. The ongoing support for staff training by MSSPs enables the Department of Safeguards to ensure access to facilities, which is critical for inspectors to practice and develop their skills.

107. In addition to Agency staff training, the Agency conducted the 2024 Safeguards Traineeship Programme for Young Graduates and Junior Professionals for eight participants —- four of them women — from the Democratic Republic of the Congo, Jordan, Kuwait, Namibia, the Philippines, Rwanda, Thailand and Togo. Since 1983, the Agency has trained 191 safeguards trainees from 75 States. This programme continues to provide young professionals with knowledge and skills to return to work in the area of peaceful nuclear energy and safeguards in their State and provides them the foundation upon which to build a career in the field of safeguards. The programme, which runs for nine months, commenced in February 2024, with support from the Czech Republic, Finland, France, Hungary, the United Kingdom, the United States of America and the European Commission.

108. As of 30 June 2025, 43% of all regular staff members in the Department were women. Women represented 39% of the staff in the Professional and higher categories. Women comprised 35% of the safeguards inspectors in the Divisions of Operations and the Office for Verification in Iran, and 33% of positions at the P5 level and above.

109. In 2024, the Department launched the Safeguards TechTrack Programme to generate a wider pool of candidates for junior professional positions and develop future talent for technical positions. To achieve this, TechTrack is seeking support in creating up to 20 extrabudgetary funded P1 and P2 positions. Recruitment efforts have already received applications from over 100 nationalities, 40% of which are from female candidates.

C. 12. Quality Management

110. The quality management system (QMS) within the Department of Safeguards provides regular oversight of the key safeguards processes to ensure impartiality, effectiveness and efficiency of safeguards implementation. The following quality management activities for the Department of Safeguards took place during the reporting period:

- Conducted two internal quality audits and one assessment, with a primary focus on departmental knowledge management activities. The audits focused on compliance with the requirements of the ISO 9001:2015 standard at the SAL in Seibersdorf and compliance with the requirements of ISO 17025:2017 at the ERML;
- Condition reports were opened identifying quality, radiological and industrial safety, and security events. Root cause analyses were performed to identify actions to prevent recurrence.

111. Process analysis and improvement activities continued, including:

- Reviewing, updating, and developing documentation that supports in-field and Agency Headquarters verification activities, as well as aligning safeguards implementation documentation with the State-level concept;
- Addressing recommendations from internal quality audits and assessments;
- Providing training for the ERML’s Laboratory Quality Manager and Laboratory Assessor on ISO 17025:2017, ISO 9001:2015 and ISO 19011 standards;
- Issuing updates on the progress and results of safeguards knowledge management efforts as part of the Agency's overall knowledge management activities.

C.13. Organizational Resilience

112. 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. The Department made significant progress with the implementation of its plan to replace aging IT infrastructure with modern, more flexible hardware. Expansion of mass storage at Agency Headquarters and server upgrades at the Agency's regional safeguards offices in Canada and Japan have been completed. Network upgrades at Agency Headquarters are now the only remaining tasks.

113. Significant progress was also made with the establishment of the foundation for disaster recovery capabilities at the Agency's premises in Seibersdorf. Several restorations exercises were successfully completed with increasingly shorter restoration times. Further and more complete restoration scenarios will take place in a phased manner.

114. By the end of 2024, the Department of Safeguards successfully completed the implementation and testing of IT systems at the disaster recovery site for the Tokyo Regional Office. This milestone follows the signing in 2023 of a contract with the disaster recovery site owners, the United Nations University (UNU). With the IT systems now in place, the UNU site is fully prepared to serve as a backup in the event of an extended unavailability of the Tokyo Regional Office. Moving forward, staff from the Department together with local staff will conduct regular tests of the site as needed to ensure its continued readiness.

115. During the reporting period, in the context of business continuity and disaster recovery, the Department of Safeguards continued to face challenges to its operations as a consequence of the armed conflict in Ukraine.

C.13.1 Information Security and Protection[24]

116. Safeguards information security continued to be a priority. The Department of Safeguards protects all safeguards information through the information security management policies and procedures established and administered by the Department of Safeguards itself, due to the critical nature of the information under the Department's protection. The Agency's regime for the protection of safeguards confidential information was approved by the Board of Governors in 1997,[25] when the introduction of the AP widened the range of safeguards information to be provided by States that brought APs into force. The main elements of the regime include the appropriate classification of information; utilizing authorization processes and technologies to ensure that access is provided on a need-to-know basis; and a layered, defence-in-depth approach to security controls. The Department's commitment to operating its security effectively is underpinned by a security awareness training programme for Agency staff, and regular testing of its effectiveness.

117. The Department's security model for information systems relies on increasing layers of protection from cyber-attacks. The general-purpose computing network of the Department is protected by effective security controls to mitigate the risk of targeted cyber intrusion. For the higher classification levels of information, the Department operates an environment that is protected by the same controls, but is isolated from the internet to further prevent the unauthorized disclosure, destruction, or alteration of data.

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[24] GC(68)/RES/12, OP 40.

[25] The confidentiality regime is described in GOV/2897, as supplemented by the measures set forth in the Annex to GOV/2959.

118. The Department continued to execute its defence-in-depth, risk-focused programme of security controls to protect its information. By focusing on the critical strategies for reducing the risk and the impact of targeted cyber intrusions, the Department seeks to deliver highly effective information security protection in an efficient manner.

119. The Department conducted assessments in the area of information security and implemented effective measures to mitigate attacks by making continuous efforts to identify and remediate vulnerabilities in the security system, which is a critical factor in limiting the risk of targeted cyber-attack. In response to the rise in both criminal and targeted cyber intrusion attempts, as well as the continuous increase in sophistication of cyber threats, the Department completed a major initiative to improve its ability to detect and respond to cyber incidents on the internet-facing network. Moreover, the Department completed the deployment of extended cyber-attack detection and response capabilities.

120. Physical security controls, in the form of access control and monitoring, are a crucial part of the Department's information protection standards. In 2023, the Department embarked upon a multi-year project to update the system that controls access to its premises as well as the components that manage the intrusion alarms and video monitoring. The upgrades are expected to continue through 2025, with completion in early 2026.

C. 14. Safeguards Reporting

121. The Secretariat reported the safeguards conclusions for 2024 in The Safeguards Implementation Report for 2024 (GOV/2025/22), which also provided data on the number and type of facilities and LOFs under safeguards, and the inspection effort and related cost of safeguards implementation. At its June 2025 meeting, the Board of Governors took note of the report and authorized the release of the 'Safeguards Statement for 2024' and the 'Background to the Safeguards Statement and Summary'.[26]

[26] The 'Safeguards Statement for 2024' and the 'Background to the Safeguards Statement and Summary' is available at: https://www.iaea.org/sites/default/files/25/06/sir-2024.pdf

The cover of the Safeguards Implementation Report for 2024 (Photo: IAEA)

C.15. Strategic Planning and Partnerships[27]

122. During the reporting period, the Secretariat leveraged the contributions (financial and in-kind) of MSSPs to enhance its nuclear verification capabilities through 281 distinct tasks across 28 technical areas. These partnerships with 23 States[28] and the European Commission focus on addressing specific development and implementation support needs for safeguards through collaboration, research and development, and the provision of equipment, materials, and access to facilities for training or equipment testing purposes. The Agency also renewed partnership agreements with four non-traditional partners: the Center for Energy and Security Studies (CENESS, the Russian Federation), the European Safeguards Research and Development Association (ESARDA, Italy), the Institute of Nuclear Materials Management (INMM, the United States of America) and the Verification Research, Training and Information Centre (VERTIC, the United Kingdom).

123. The Department and its MSSPs made significant progress towards achieving planned outputs from the Development and Implementation Support Programme for Nuclear Verification, 2024–2025. During the reporting period, a total of 41 virtual and in-person meetings were held with 22 MSSPs to review current and proposed activities. Staff members in the Department and MSSP stakeholders use a

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[27] GC(68)/RES/12, OP 33.

[28] MSSPs are provided by Argentina, Australia, Belgium, Brazil, Canada, China, the Czech Republic, Finland, France, Germany, Hungary, Japan, the Republic of Korea, the Kingdom of the Netherlands, Norway, the Russian Federation, South Africa, Spain, Sweden, Switzerland, the United Arab Emirates, the United Kingdom and the United States of America.

dedicated software application—the Support Programme Information and Communication System (SPRICS)—to track tasks and progress.

124. As part of its strategic analysis and planning activities, the Agency organized an Emerging Technologies Workshop on the theme of "Artificial Intelligence for Nuclear Verification". A summary report of the workshop is available on the IAEA website.[29]

The Emerging Technologies Workshop: Artificial Intelligence for Nuclear Verification, January 2025 (Photo: IAEA)

[29] Available at: https://www.iaea.org/sites/default/files/25/07/emerging-technologies-workshop-artificial-intelligence-for-nuclear-verification.pdf

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