Nuclear Verification

184

States with safeguards agreements in force of which

136 **States had additional protocols in force**

2953 **inspections, design information verifications and complementary access requiring over**

13 000 **days in the field**

1324

nuclear facilities and locations outside facilities

over 215 000 significant quantities of nuclear material

€ 142.9 million

regular budget +

€ 20.2 million extrabudgetary

20

Member State Support Programmes

1 **multinational support programme**

European Commission

Conclusions

69 States
all nuclear material remained in peaceful activities

106 States
declared nuclear material remained in peaceful activities

3 States
nuclear material, facilities or other items to which safeguards had been applied remained in peaceful activities

5 States
nuclear material in selected facilities to which safeguards had been applied remained in peaceful activities

Nuclear Verification [1,2]

Objective

To deter the proliferation of nuclear weapons by detecting early the misuse of nuclear material or technology and by providing credible assurances that States are honouring their safeguards obligations, and, in accordance with the Agency's Statute, assist with other verification tasks, including in connection with nuclear disarmament or arms control agreements, as requested by States and approved by the Board of Governors.

Implementation of Safeguards in 2019

At the end of every year, the Agency draws a safeguards conclusion for each State for which safeguards are applied. This conclusion is based on an evaluation of all safeguards relevant information available to the Agency in exercising its rights and fulfilling its safeguards obligations for that year.

In 2019, safeguards were applied for 183 States[3,4] with safeguards agreements in force with the Agency. Of the 131 States that had both a comprehensive safeguards agreement (CSA) and an additional protocol (AP) in force[5] the Agency drew the broader conclusion that *all* nuclear material remained in peaceful activities for 69 States[6]; for the remaining 62 States, as the necessary evaluation regarding the absence of undeclared nuclear material and activities for each of these States remained ongoing, the Agency concluded only that *declared* nuclear material remained in peaceful activities. For 44 States with a CSA but with no AP in force, the Agency concluded only that *declared* nuclear material remained in peaceful activities.

For those States for which the broader conclusion has been drawn, the Agency is able to implement integrated safeguards: an optimized combination of measures available under CSAs and APs to maximize effectiveness and efficiency in fulfilling the Agency's

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1 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.

2 The referenced number of States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons is based on the number of instruments of ratification, accession or succession that have been deposited.

3 These States do not include the Democratic People's Republic of Korea (DPRK), where the Agency did not implement safeguards and, therefore, could not draw any conclusion.

4 And Taiwan, China.

5 Or an AP being provisionally applied, pending its entry into force.

6 And Taiwan, China.

safeguards obligations. Integrated safeguards were implemented for the whole of 2019 or part thereof for 67 States[7,8].

Safeguards were also implemented with regard to nuclear material in selected facilities in the five nuclear-weapon States party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) under their respective voluntary offer agreements. For these five States, the Agency concluded that nuclear material in selected facilities to which safeguards had been applied remained in peaceful activities or had been withdrawn from safeguards as provided for in the agreements.

For three States not parties to the NPT the Agency implemented safeguards pursuant to item-specific safeguards agreements based on INFCIRC/66/Rev.2. For these States the Agency concluded that nuclear material, facilities or other items to which safeguards had been applied remained in peaceful activities.

As of 31 December 2019, 10 States Parties to the NPT had yet to bring CSAs into force pursuant to Article III of the Treaty. For these States Parties, the Agency could not draw any safeguards conclusions.

Conclusion of safeguards agreements and APs, and amendment and rescission of small quantities protocols

The Agency continued to facilitate the conclusion of safeguards agreements and APs (Fig. 1), and the amendment or rescission of small quantities protocols (SQPs)[9]. The status of safeguards agreements and APs as of 31 December 2019 is shown in Table A6 in the Annex to this report. During 2019, a CSA with an SQP and an AP entered into force for Benin. A CSA with an SQP was signed for the State of Palestine[10]. In addition, the Board of Governors approved a CSA with an SQP and an AP for Sao Tome and Principe. An AP entered into force for Ethiopia. An AP was signed for the Plurinational State of Bolivia.

The Agency continued to implement the *Plan of Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols*[11], which was updated in September 2019.

During 2019, SQPs were amended for Cameroon, Ethiopia, France[12] and Papua New Guinea. By the end of 2019, 68 States had accepted the revised SQP text (which was in force for 62 of these States) and 8 States had rescinded their SQPs.

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7 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, Republic of Korea, Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Madagascar, Mali, Malta, Mauritius, Monaco, Montenegro, Netherlands, New Zealand, North Macedonia, 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.

8 And Taiwan, China.

9 Many States with minimal or no nuclear activities have concluded an SQP to their CSA. Under an SQP, the implementation of most of the safeguards procedures in Part II of a CSA is held in abeyance as long as certain criteria are met. In 2005, the Board of Governors took the decision to revise the standardized text of the SQP and change the eligibility criteria for an SQP, making it unavailable to a State with an existing or planned facility and reducing the number of measures held in abeyance (GOV/INF/276/Mod.1 and Corr.1). The Agency initiated exchanges of letters with all States concerned in order to give effect to the revised SQP text and the change in the criteria for an SQP.

10 The designation employed does not imply the expression of any opinion whatsoever concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

11 Available at: *https://www.iaea.org/sites/default/files/19/09/sg-plan-of-action-2018-2019.pdf*

12 The SQP to the safeguards agreement reproduced in INFCIRC/718 between France, the European Atomic Energy Community and the Agency pursuant to Additional Protocol I of the Treaty of Tlatelolco, covering France's Protocol I territories, was amended.

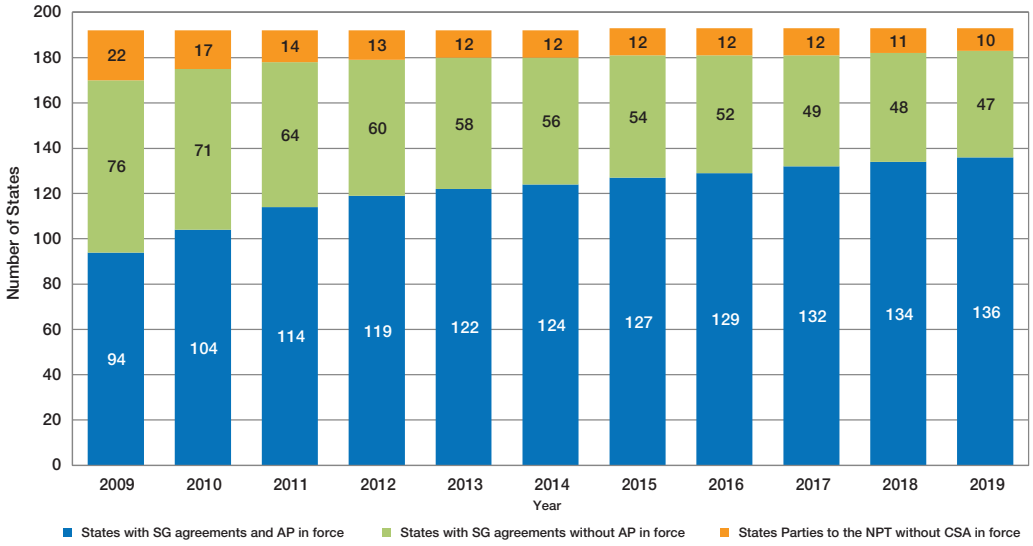

FIG. 1. Number of APs for States with safeguards agreements in force, 2009–2019 (the Democratic People's Republic of Korea is not included).

Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015)

Throughout 2019, the Agency continued to verify and monitor the nuclear-related commitments of the Islamic Republic of Iran (Iran) under the Joint Comprehensive Plan of Action (JCPOA). During the year, four quarterly reports and six reports providing updates on developments in between the issuance of quarterly reports were submitted to the Board of Governors and in parallel to the United Nations Security Council entitled *Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015)* (GOV/2019/10, GOV/2019/21, GOV/INF/2019/8, GOV/INF/2019/9, GOV/INF/2019/10, GOV/2019/32, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2019/17 and GOV/2019/55).

Syrian Arab Republic (Syria)

In August 2019, the Acting Director General submitted a report to the Board of Governors entitled *Implementation of the NPT Safeguards Agreement in the Syrian Arab Republic* (GOV/2019/34) covering relevant developments since the previous report in August 2018 (GOV/2018/35). The Acting Director General informed the Board of Governors that no new information had come to the knowledge of the Agency that would have an impact on the Agency's assessment that it was very likely that a building destroyed at the Dair Alzour site was a nuclear reactor that should have been declared to the Agency by Syria[13]. In 2019, the Director General and Acting Director General renewed calls on Syria to cooperate fully with the Agency in connection with unresolved issues related to the Dair Alzour site and other locations. Syria has yet to respond to these calls.

[13] The Board of Governors, in its resolution GOV/2011/41 of June 2011 (adopted by a vote), had, inter alia, called on Syria to urgently remedy its non-compliance with its NPT Safeguards Agreement and, in particular, to provide the Agency with updated reporting under its Safeguards Agreement and access to all information, sites, material and persons necessary for the Agency to verify such reporting and resolve all outstanding questions so that the Agency could provide the necessary assurance as to the exclusively peaceful nature of Syria's nuclear programme.

Democratic People's Republic of Korea (DPRK)

In August 2019, the Acting Director General submitted a report to the Board of Governors and the General Conference entitled *Application of Safeguards in the Democratic People's Republic of Korea* (GOV/2019/33–GC(63)/20), which provided an update of developments since the Director General's report of August 2018 (GOV/2018/34-GC(62)/12). In 2019, no verification activities were implemented in the field, but the Agency continued to monitor developments in the DPRK's nuclear programme and to evaluate all safeguards relevant information available to it. Some of the DPRK's nuclear facilities appeared not to be operating, while activities at some other facilities appeared to continue or were developed further. The Agency has not had access to the Yongbyon site or to other locations in the DPRK. Without such access, the Agency cannot confirm either the operational status or configuration/design features of the facilities or locations, or the nature and purpose of the activities conducted therein. The Secretariat intensified efforts to enhance the Agency's readiness to play its essential role in verifying the DPRK's nuclear programme once a political agreement has been reached among the countries concerned. The continuation of the DPRK's nuclear programme is a clear violation of relevant United Nations Security Council resolutions and is deeply regrettable.

Enhancing Safeguards

Evolving safeguards implementation

During 2019, the Agency developed a State-level safeguards approach (SLA) for one State with a CSA. This brings the total number of States with a CSA for which an SLA has been developed to 131. These 131 States hold 97% of all nuclear material (by significant quantity) under Agency safeguards in States with a CSA and include 67 States with a CSA and an AP in force for which the broader conclusion has been drawn; 37 States with a CSA and an AP in force for which the broader conclusion was not drawn for 2019; and 27 States with a CSA but no AP in force. For those States where SLAs are not implemented, in-field safeguards activities are based on the Safeguards Criteria, and new techniques and technologies are implemented, as applicable, to strengthen effectiveness and improve efficiency.

Cooperation with State and regional authorities

To assist States in building capacity for implementing their safeguards obligations, the Agency conducted 12 international, regional and national training courses for those responsible for overseeing and implementing the State and regional systems of accounting for and control of nuclear material. In total, approximately 300 participants from some 50 countries were trained on safeguards related topics. The Agency, upon request, conducted two IAEA State System of Accounting for and Control of Nuclear Material Advisory Service (ISSAS) missions in the year. It also participated in more than 15 other training activities organized by Member States on a bilateral basis. All of these activities were supported financially or in kind through Member State Support Programmes.

Safeguards equipment and tools

The Agency ensured that the instrumentation and monitoring equipment installed in nuclear facilities around the world, which is vital to effective safeguards implementation, continued to function as required. At the end of 2019, 1708 unattended safeguards data

streams were collected remotely from 140 facilities in 30 States[14]. The Agency also had 1425 cameras operating at 261 facilities in 37 States[15]. The Agency is completing the transition to the next generation surveillance system (NGSS) by replacing the camera systems that are reaching their end of life cycle. By the end of 2019, 1031 NGSS cameras had been installed in 33 States[16].

In 2019, Member State Support Programmes were essential to enabling the evaluation, design, testing and preparation of new safeguards technology to address new verification challenges. These innovative systems include the prototype unattended verification system for uranium hexafluoride cylinders; the fast neutron coincidence collar system for measuring new fresh fuel with burnable poison rods; and the authorized passive gamma emission tomography (PGET) system for verifying spent fuel in closed containers in spent fuel ponds.

The Agency continued to undertake activities aimed at identifying and evaluating emerging instrumentation technologies that could support safeguards implementation. In 2019, further work was conducted on the next generation Cerenkov viewing device used for the verification of spent fuel, and a second technology challenge was organized to compare possible alternatives for post-processing PGET data.

After completing the modernization of safeguards information technology (IT) under the MOSAIC project, in 2019 the Agency focused on enhancing existing and developing new safeguards software capabilities in line with the Departmental strategic priorities.

Safeguards analytical services

The Agency's Network of Analytical Laboratories consists of the Agency's Safeguards Analytical Laboratory and 23 other qualified laboratories (Fig. 2). During the year, five additional laboratories for sample analysis and reference material provision were in the process of qualification.

FIG. 2. The Agency's Environmental Sample Laboratory in Seibersdorf, Austria.

[14] And Taiwan, China.

[15] And Taiwan, China.

[16] And Taiwan, China.

In 2019, the Agency collected 492 nuclear material samples that were analysed by the Agency's Nuclear Material Laboratory. The Agency also collected 405 environmental samples, which resulted in analysis of 918 subsamples; a total of 104 of these subsamples were analysed at the Agency's Environmental Sample Laboratory and the Nuclear Material Laboratory, with the remainder analysed by other laboratories in the Network of Analytical Laboratories.

Support

Developing the safeguards workforce

In 2019, the Agency conducted 103 safeguards training courses to provide safeguards inspectors and analysts with the necessary technical and behavioural competencies. To enhance practical competencies for safeguards implementation in the field, a number of courses were held at nuclear facilities to train safeguards staff in a realistic environment for effective and integrated training (Fig. 3). These training courses provide participants with the understanding and skills necessary to prepare, conduct and report on inspections, and to conduct design information verification activities and complementary accesses. New training courses were also delivered in 2019, including an industrial safety course for inspectors and a criticality check refresher course.

FIG. 3. Using a Cerenkov viewing device, Agency inspectors verify the presence of spent nuclear fuel at a research reactor.

Preparing for the Future

The Agency prepared the *Development and Implementation Support Programme for Nuclear Verification 2020–2021* (STR-393) in 2019 (Fig. 4). At the end of the year, the Development and Implementation Support Programme for Nuclear Verification comprised 250 discrete support programme tasks in 25 projects, and 20 Member States[17] and the European Commission had formal support programmes with the Agency.

[17] Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, Finland, France, Germany, Hungary, Japan, Republic of Korea, Netherlands, Russian Federation, South Africa, Spain, Sweden, United Kingdom and United States of America.

FIG. 4. An Agency safeguards inspector reviewing settings on a handheld unit of the Backpack Radiation Monitor, part of the Extended Multi-Component Inspector Kit (MCIK). The deployment of the MCIK was part of the Development and Implementation Support Programme for Nuclear Verification 2020–2021 (STR-393).