

General Conference

GC(55)/16
Date: 26 July 2011

General Distribution
Original: English

Fifty-fifth regular session

Item 18 of the provisional agenda
(GC(55)/1 plus Add.1)

Strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol

Report by the Director General

A. Introduction

1. The General Conference, in its resolution on ‘Strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol’ (GC(54)/RES/11), requested the Director General to report on the implementation of the resolution to the fifty-fifth regular session. This report responds to that request and updates the information in last year’s report to the General Conference (GC(54)/11).

B. Safeguards Agreements and Additional Protocols

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

2. Between 1 July 2010 and 30 June 2011, comprehensive safeguards agreements (CSAs) in connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) entered into force for three States¹, and additional protocols (APs), based on the Model Additional Protocol², for eight

¹ Andorra, Montenegro and Mozambique.

² The text of the Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards is contained in document INFCIRC/540 (Corr.).

States³. An INFCIRC/66/Rev.2-type safeguards agreement entered into force for one State⁴. During the same period, one additional State signed an AP⁵. Small quantities protocols (SQPs) were amended for five States⁶ in keeping with the Board of Governors' decision of 20 September 2005 regarding such protocols. By the end of June 2011, of the 92 States with operative SQPs⁷, 42 had brought modified SQPs into force.

3. As of 30 June 2011, 178 States⁸ had safeguards agreements in force with the Agency, 109 of which (including 104 States with CSAs) also had APs in force. Sixty-nine States have yet to bring into force APs to their safeguards agreements.

4. Fifteen non-nuclear-weapon States party to the NPT have yet to bring CSAs into force⁹. The latest update of the status of safeguards agreements and APs is published on the IAEA website¹⁰.

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

5. The Secretariat has continued to implement elements of the plan of action outlined in resolution GC(44)/RES/19 and the Agency's updated Plan of Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols (September 2010)¹¹. Among the elements of the plan of action proposed in GC(44)/RES/19 are:

- Intensified efforts by the Director General to conclude safeguards agreements and APs, especially with those States which have significant nuclear activities;
- Assistance by the Agency and Member States to other States on how 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.

6. Guided by the relevant resolutions of the General Conference and decisions of the Board of Governors, the Agency's updated Plan of Action and the Agency's Medium Term Strategy¹², the Secretariat has continued to encourage and facilitate wider adherence to the safeguards system, using primarily extrabudgetary funds.

³ Albania, Costa Rica, Mexico, Montenegro, Morocco, Mozambique, Swaziland and the United Arab Emirates.

⁴ Pakistan.

⁵ Bahrain.

⁶ El Salvador, Guatemala, Panama, San Marino and Swaziland.

⁷ Excluding SQPs to safeguards agreements concluded pursuant to protocols to the Tlatelolco Treaty.

⁸ And Taiwan, China.

⁹ Benin, Cape Verde, Congo (Republic of the), Djibouti, Eritrea, Equatorial Guinea, Guinea, Guinea Bissau, Liberia, Micronesia, São Tomé & Príncipe, Somalia, Timor-Leste, Togo and Vanuatu.

¹⁰ http://www.iaea.org/OurWork/SV/Safeguards/documents/sir_table.pdf.

¹¹ The Plan of Action is published on the IAEA website:
http://www.iaea.org/OurWork/SV/Safeguards/documents/sg_actionplan.pdf.

¹² The Medium Term Strategy for 2006-2011 is contained in document GOV/2005/8 and is available at <http://www.iaea.org/About/mts.html>.

7. Since last year's report, in order to facilitate the conclusion and implementation of CSAs and APs, and the implementation of the Board's decision on SQPs, the Secretariat has convened three outreach events: an interregional seminar on the Agency's safeguards system for States in Southeast and South Asia with limited nuclear material and activities and a regional seminar on the Agency's safeguards system for States in Southeast Asia with significant nuclear activities (both held in Singapore, March 2011); and a briefing for a number of Permanent Missions on the Agency's safeguards system (Geneva, May 2011). In addition, the Secretariat held consultations with representatives from Member and non-Member States in Berlin, Geneva, New York and Vienna.

C. Implementation and Further Development of the Safeguards System

C.1. Strategic Planning

8. Since last year's report, the Secretariat has continued to implement its long-term strategic planning methodology and completed a Long-Term Strategic Plan (2012–2023) for the Department of Safeguards. The Plan is an internal management tool intended to help the Department to deliver improved services to Member States and support the implementation of the Agency's Medium Term Strategy¹³. The Plan addresses the conceptual framework, legal authority, technical capabilities (expertise, equipment and infrastructure) and human and financial resources necessary for Agency verification activities. It also considers how to enhance communication, cooperation and partnerships with the Agency's stakeholders and identifies various initiatives to improve the ways in which the Department works. A number of steps, including a re-organization of the Department of Safeguards, are already being taken to support the implementation of the Plan. The Plan will be subject to periodic review and updating.

C.2. State-level Concept for the Planning, Implementation and Evaluation of Safeguards

9. The drawing of soundly-based safeguards conclusions is of the utmost importance to the Agency. To this end, the Secretariat has continued to develop the State-level concept for the planning, implementation and evaluation of safeguards. The State-level concept is a holistic approach to safeguards implementation applicable to all States and based on a comprehensive State evaluation and a State-level approach, including the identification of specific safeguards measures for each individual State, implemented through an annual implementation plan. The concept of considering the State as a whole enables State-specific factors to be taken into consideration at all stages of safeguards implementation.

10. The Secretariat's safeguards conclusions are based upon an evaluation of all information available to the Agency. Key to the process by which safeguards conclusions are drawn and the requisite verification activities are determined is the State evaluation process. This is a dynamic, iterative process in which evaluation results constitute the basis for planning safeguards activities, assessing their results and identifying any follow-up actions (e.g. additional information collection/analysis or verification activities) required for drawing soundly-based safeguards

¹³ IAEA Medium Term Strategy for 2012-2017 is contained in document GOV/2010/66 and is available at <http://www.iaea.org/About/mts.html>.

conclusions. Safeguards implementation at the State level can, therefore, be described as ‘information driven’. By being responsive to changes, the implementation of the State-level concept ensures that the assurances provided to the international community remain credible and up-to-date. Since last year’s report, the State evaluation process has been further improved: by moving to a system of ongoing, collaborative analysis by multidisciplinary State Evaluation Groups; assigning a departmental team, consisting of senior safeguards staff, to review the quality of several State evaluation reports in order to identify any generic weaknesses in the process and to make recommendations for improvement; and by introducing an improved system of evaluating and reviewing States.

11. As part of its efforts to move towards a safeguards system that is *fully* information driven, the Secretariat has also worked to strengthen the links between the State evaluation process and verification activities. All information regarding a State’s nuclear programme, including feedback from inspection-related activities, needs to be evaluated, not only to draw safeguards conclusions but also to determine the safeguards activities to be conducted with respect to that State in order to maintain those conclusions. This helps the Agency to customize and focus its verification activities in the field and at Headquarters.

12. For those States for which the broader conclusion has been drawn that all nuclear material remained in peaceful activities and for which a State-level integrated safeguards approach has been approved, the Agency implements integrated safeguards. In 2010, integrated safeguards were implemented during the whole year in 47¹⁴ States (an increase of 11 States compared to 2009), and for part of the year in one State. Additionally, the Agency updated State-level integrated safeguards approaches for four States.

C.3. Safeguards Approaches, Procedures and Techniques

C.3.1. Research and Development Programme

13. Research and development (R&D) in safeguards approaches, procedures, techniques and training, carried out with the assistance of Member State Support Programmes (MSSPs), is essential to meeting future safeguards challenges. The Agency’s needs are communicated to the MSSPs through a biennial R&D Programme for Nuclear Verification. The R&D Programme for Nuclear Verification 2010–2011 contains 24 projects reflecting high priority needs for the further enhancement of efficient and effective safeguards activities. By 30 June 2011, 21 MSSPs¹⁵ were supporting over 300 individual tasks within these projects valued at over €20 million per annum. The tasks address issues such as safeguards concepts and approaches; verification techniques and instruments; information collection, processing and analysis; quality management; and training.

C.3.2. Safeguards for Existing and New Types of Facility

14. The Secretariat has continued to develop and implement more efficient approaches for verifying spent fuel transfers, involving unattended monitoring and surveillance systems, and using short notice and unannounced inspections. The Secretariat also tested an inspection concept using new combinations of existing techniques and technologies, such as remote monitoring, unattended measurements and unannounced or short-notice inspections, to enhance the effectiveness and efficiency of safeguards implementation.

¹⁴ See footnote 8.

¹⁵ Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, European Commission, Finland, France, Germany, Hungary, Japan, Netherlands, Republic of Korea, Russian Federation, South Africa, Spain, Sweden, United Kingdom and the United States of America.

15. The Agency has been directly involved in the early design stage for a new spent fuel conditioning plant and new shelter over the damaged Reactor Unit 4 at the Chernobyl Nuclear Power Plant in order to integrate the safeguards systems in the facility designs. The Agency has procured a new surveillance system and upgraded existing systems at the facility. Construction of the Japanese Mixed Oxide Fuel Fabrication Plant (J-MOX) began in October 2010. The Agency conducted design information examination to validate the proposed safeguards approach for the facility, started detailed design of non-destructive assay (NDA) equipment, and produced a prototype NDA system for testing in 2011.

16. The Agency has been working to enhance safeguards implementation for future facilities. For the effective and efficient implementation of safeguards at a new facility, safeguards concepts need to be considered in the initial planning stages of a facility. This not only improves the Agency's ability to implement safeguards at the facility but also enables design changes to be effected when the costs of such changes are reasonably low. The Agency is already preparing for safeguarding new types of facilities such as geological repositories, pyroprocessing plants and laser enrichment facilities. Meetings were held with experts from States developing pyroprocessing technology and training of Agency staff is ongoing with respect to both pyroprocessing and laser enrichment technologies. Through the Agency's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) and the Generation IV International Forum (GIF), the Secretariat contributed to assessments of proliferation resistance of nuclear energy systems, helping to finalize the 'Proliferation Resistance Acquisition/Diversion Pathway Analysis' report for publication. During 2010, Canada, Finland and Sweden initiated safeguards by design interactions with the Agency for future facilities.

C.3.3. Information Technology and Analysis

17. The Agency has continued to work on the IAEA Safeguards Information System (ISIS) Re-engineering Project (IRP) to increase the effectiveness and efficiency of information processing by replacing the current information system with a modern, integrated one. Significant progress was made in the design of key services which will support the evolution towards a safeguards system that is fully information driven. 'Role based' access controls were introduced to allow secure access to any information available in the Department for those staff who need it. Information stored on the mainframe was migrated to the new system. A new project was launched with the objective of providing a geospatial exploitation system to facilitate the analysis and dissemination of information.

18. The Secretariat has continued to utilize high resolution commercial satellite-based sensors to improve its ability to monitor nuclear sites and facilities worldwide. By 30 June 2011, imagery was being acquired from 32 different Earth observation satellites (an increase of 10 satellites since last year's report), and contracts were established with new imagery providers to diversify sources and ensure the integrity and authenticity of satellite imagery. The use of imagery analysis has continued to be a great asset to the Agency, particularly in planning and implementing in-field verification activities. Since last year's report, over 160 imagery analysis reports, including several imagery-derived geospatial products, have been produced.

19. The Agency routinely uses information on exports and imports of nuclear-related equipment and non-nuclear material to assess the completeness of State declarations and to support the analysis of nuclear-related trade. A number of States voluntarily provide to the Agency information on certain procurement enquiries and export denials relating to nuclear technology. The Agency's analysis of such information complements other safeguards information and is used to support its verification activities and the State evaluation process. Since last year's report, through workshops and other outreach efforts, the Secretariat has continued to raise awareness of the usefulness of such information. The number of States providing such data has doubled while others are actively considering doing so.

C.3.4. Safeguards Analytical Services

20. The collection and analysis of nuclear material and environmental samples is essential for the Agency to verify that States' declarations with respect to their nuclear material and activities are correct and complete. Sample analysis is performed in the Agency's Safeguards Analytical Laboratories (SAL) in Seibersdorf, which consist of the Nuclear Material Laboratory (NML) and the Environmental Sample Laboratory (ESL), and in other laboratories of the Agency's Network of Analytical Laboratories (NWAL). In 2010, Agency inspectors submitted 599 nuclear material samples and 18 heavy water samples to the laboratories for analysis. All samples taken for accountancy verification purposes, except the heavy water samples, were analysed in the NML. Agency inspectors also collected 497 environmental samples, all of which were screened in the ESL and resulted in the dispatch of 925 sub-samples to the NWAL for bulk and particle analysis for uranium and plutonium isotopes. The ESL itself received 57 environmental swipe samples for analysis.

21. Since last year's report, significant progress has been made on the 'Enhancing the Capability of the Safeguards Analytical Services' (ECAS) project. A large-geometry secondary ion mass spectrometer (LG-SIMS) was delivered to the ESL in April 2011. The new Clean Laboratory Extension at ESL, which houses the LG-SIMS, is fully operational and the LG-SIMS has been tested with safeguards samples. Design work for the new NML is on schedule, construction of which is expected to begin in the third quarter of 2011, pending the availability of funding.

22. Efforts to expand the NWAL to enable it to conduct analysis of both nuclear material and environmental swipe samples have continued. The NWAL currently consists of 19 laboratories in eight Member States, the European Commission and the IAEA. Since last year's report, a laboratory in Brazil has qualified for the NWAL. Laboratories in Belgium, China, Finland, France, Hungary, the Republic of Korea and the United States of America are either being assessed in terms of their capabilities and capacities or are already at various stages of the qualification process.

C.3.5. Safeguards Equipment

23. Since last year's report, the use of safeguards verification instruments has been further enhanced with regard to both installed and portable equipment. At the end of June 2011, the Agency had 1187 cameras connected to 616 systems operating at 245 facilities in 33 States¹⁶. There were 145 unattended monitoring systems operating in 54 facilities in 21 States. In addition, remote monitoring systems continued to be installed or upgraded: 261 surveillance or radiation monitoring systems with remote transmission capabilities were authorized for inspection use in 20 States¹⁷ (152 surveillance systems with 583 cameras and 109 unattended radiation monitoring systems). All these systems are capable of transmitting all of the data required for safeguards purposes. As a result of significant effort, at the end of 2010 new remote monitoring capabilities were being implemented for 26 unattended monitoring systems at the Rokkasho Reprocessing Plant in Japan.

24. To ensure the reliability of the Agency's standard equipment systems, significant financial and human resources continued to be spent in preventive maintenance and performance monitoring. The reliability of digital surveillance systems, unattended monitoring systems and electronic seals has exceeded the target reliability of 150 months for the mean time between failures.

¹⁶ See footnote 8.

¹⁷ See footnote 8.

25. Under the Novel Technologies project the Secretariat has continued its efforts in developing the database on indicators and signatures associated with the nuclear fuel cycle and in identifying, evaluating and introducing advanced technologies for early detection of undeclared nuclear material and activities.

C.4. Cooperation with State and Regional Authorities and Effectiveness of SSACs and RSACs

26. The effectiveness and efficiency of IAEA safeguards depend, to a large extent, on the effectiveness of State and regional systems of accounting for and control of nuclear material (SSACs/RSACs) and on the level of cooperation between the State/regional authorities and the Agency. States and regional organizations need legislative and regulatory systems to be able to exercise the necessary regulatory and control functions. In order to enable them to fulfil their safeguards obligations, State/regional authorities also need resources, procedures and the technical and analytical capability to perform nuclear material measurements and other control measures commensurate with the size and complexity of their respective nuclear fuel cycles.

27. The IAEA SSAC Advisory Service (ISSAS) provides States, at their request, with advice and recommendations on the establishment and strengthening of SSACs. By the end of June 2011, 13 ISSAS missions had been conducted. Since last year's report, a preparatory visit for a forthcoming ISSAS mission has been conducted in Mexico.

28. The Agency also provides training to personnel of State and regional authorities. Since last year's report, the Agency has conducted 12 international, regional and national training courses for States to assist them in fulfilling their safeguards obligations. Basic courses included two international SSAC courses, in the Russian Federation and in the United States of America, and three regional SSAC courses, in Burkina Faso, Chile and Japan. More specific training included a regional workshop in Indonesia on nuclear material accounting and control at facilities and a regional training course in Jordan for States in the Middle East with limited nuclear material and activities. To meet more specific national needs, the Secretariat organized a national SSAC training course in Nigeria; two workshops on AP implementation, one for Iraq in Vienna and another in Belarus; one seminar on AP implementation in the Philippines; and an NDA course in Algeria. The Agency also visited a number of African States to assist them in fulfilling implementation requirements of their respective CSAs, SQPs and APs.

29. Cooperation between the Agency, the European Commission and the European Union (EU) States continued during the year, with implementation of integrated safeguards being applied at all facilities within the non-nuclear-weapon States of the EU. Technical cooperation between the Agency and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) also continued. Discussions with ABACC on how to implement some safeguards strengthening measures and revised policies relating to conversion, enrichment and design information verification remain ongoing. Arrangements remain in place with both the European Commission and ABACC for the sharing of costs associated with the purchase and installation of safeguards equipment for joint use by the Agency and the respective regional authority, which result in efficiencies in safeguards implementation.

C.5. Safeguards Workforce

30. Since last year's report, 61 major training courses covering basic, refresher and advanced training have been conducted for Agency safeguards staff. Basic training included: the Introductory Course on Agency Safeguards for twenty newly recruited inspectors; comprehensive inspection exercises at light water reactors and bulk handling facilities; and courses on NDA and containment and surveillance

(C/S) techniques, enhanced observational skills, and enhanced communication skills. Advanced training covered: complementary access principles and practices; pyroprocessing; centrifuge and laser enrichment; safeguards at enrichment plants; satellite imagery; uranium mining; design information verification in research reactors; statistics concepts for safeguards; proliferation indicators of different types of nuclear fuel cycle facilities; spent fuel verification; plutonium verification techniques; inspection and verification at nuclear power plants and tank calibration. In the Republic of Korea, a pilot advanced comprehensive exercise at light water and CANDU reactors was held for the first time. Refresher training in NDA and C/S equipment and procedures and in radiation protection was provided for Agency inspectors. New or updated courses focused mainly on providing safeguards staff with the knowledge and skills necessary for performing collaborative State evaluations. Laboratories and facilities made available by SAL and Member States are key assets for the implementation of the safeguards training programme. The Agency also completed a ten month Safeguards Traineeship Programme for six young graduates and junior professionals from developing countries.

C.6. Quality Management

31. During the past year, the Department of Safeguards has continued to implement its quality management system. Specific training was provided to staff in order to raise awareness of the system, to increase the use of the corrective action report system, to support continual process improvement and to improve the document control system. Knowledge management efforts focused on retaining critical job-related knowledge of retiring staff. In addition to the continuous assessment and evaluation of the quality of inspection results, the Agency conducted audits on the process for annual reporting on safeguards implementation and on the use of role-based security concepts in information systems. Moreover, the Agency completed, peer reviewed and validated a cost calculation methodology which enables it to establish and monitor the cost of carrying out safeguards activities and to compare the costs of different safeguards implementation options. The cost methodology was used in preparing the information on the State-by-State costs of safeguards implementation included in the Safeguards Implementation Report (SIR) for 2010.

C.7. Information Security

32. The Agency has continued to take steps to protect safeguards confidential information within the Secretariat addressing the human element and physical security, as well as information technology. A comprehensive campaign is being conducted to enhance staff awareness of their information security obligations. All staff of the Agency are required to pass a new mandatory information security test, and information security components have been added to specialized training courses. The scope of the confidentiality undertaking, which all staff are required to sign, has been enhanced. The physical security of offices has continued to be improved through, for example, access control systems, security doors, surveillance cameras and motion detection systems. All Agency servers, a mainframe computer, disk storage and network equipment are stored in a highly secure data centre. A security upgrade for SAL is being prepared, pending its relocation to a more secure area. Information technology is being improved through, for example, the systematic application of security patches and upgrades to servers, switches and laptop and desktop computers; better encryption; internal and external vulnerability reviews; the development of a role-based access control system; the development of in-house capabilities to combat information technology threats; and the enhancement of disaster preparedness and business continuity capability.

C.8. Safeguards Reporting

33. The safeguards conclusions for 2010 were reported in the SIR for 2010 (GOV/2011/24)¹⁸. As indicated in the SIR, in 2010 safeguards were applied for 175 States¹⁹ with safeguards agreements in force with the Agency²⁰. In response to the requests of a number of Member States, the SIR provided additional details on the results of safeguards activities, as well as more State-specific information, including the number of facilities and locations outside facilities (LOFs) under safeguards, the safeguards activities conducted, the cost of safeguards implementation; and the results of safeguards activities. At its June 2011 meeting, the Board of Governors commended the Secretariat for its efforts to improve the transparency of the report. It took note of the SIR for 2010 and authorized the release of the Safeguards Statement for 2010 and of the Background to the Safeguards Statement and Summary.

C.9. Safeguards Symposium

34. In November, at its Headquarters the Agency held its 11th symposium on international safeguards, the theme of which was ‘Preparing for Future Verification Challenges’. Around 670 participants from 64 States and 17 international organizations attended the event. The objective was to foster dialogue and information exchange between the Secretariat, Member States, the nuclear industry and members of the broader safeguards and nuclear non-proliferation community. At the symposium, the Department of Safeguards introduced its plan to move to a safeguards system that is fully information driven. Drawing from the Long-Term Strategic Plan (2012–2023) of the Department of Safeguards, participants discussed the Agency’s strategic priorities in addressing the forthcoming challenges in the areas of, inter alia, advancing cooperation between the Agency and its Member States; strengthening the Agency’s technical capabilities (safeguards approaches, technologies and infrastructure); bolstering its State evaluation capabilities (for example, information collection and evaluation); developing its organizational culture; and managing the safeguards workforce and knowledge.

¹⁸ The Safeguards Statement for 2010 and the Background to the Safeguards Statement and Summary of the Safeguards Implementation Report for 2010 are published on the IAEA website at <http://www.iaea.org/OurWork/SV/Safeguards/es2010.html>.

¹⁹ The 175 States do not include the Democratic People’s Republic of Korea (DPRK), where the Secretariat did not implement safeguards and, therefore, could not draw any conclusion.

²⁰ See footnote 8.