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Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System Including Implementation of Additional Protocols

Report by the Director General

Summary

- This report describes the progress made since the fiftieth regular session of the General Conference in strengthening the effectiveness of the safeguards system and improving its efficiency, including implementation of additional protocols.

Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System Including Implementation of Additional Protocols

A. Introduction

1. In resolution GC(50)/RES/14, “Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System, and Application of the Model Additional Protocol¹”, the General Conference requested the Director General to report to the fifty-first regular session on the implementation of the resolution. This report responds to that request and updates the information in last year’s report to the General Conference (document GC(50)/2) under this agenda item.

B. Implementation and Further Development of Safeguards Strengthening and Efficiency Measures

2. The Advisory Committee on Safeguards and Verification within the Framework of the IAEA Statute (Committee 25) held 3 meetings² between the fiftieth regular session of the General Conference and the meeting of the Board of Governors in June 2007. The Committee had been established, in June 2005, with an initial, two-year mandate, to consider ways and means to strengthen the safeguards system and to make relevant recommendations to the Board.

3. The Chair of the Advisory Committee³ introduced the Committee’s report on its work to the Board of Governors at the meeting of the Board in June 2007. The report noted, inter alia, that, although the Committee had not been able to reach agreement on recommendations to submit to the Board, it had provided an important forum for constructive discussion and useful exchanges of view among Agency Member States on safeguards matters. It also observed that the documentation and clarifications provided by the Secretariat to assist the work of the Committee had been particularly helpful in increasing the understanding and awareness of Member States on important and current safeguards issues. Several

¹ 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.).

² From 26-27 September 2006, 13-14 February 2007 and on 29 May 2007.

³ H.E. Ms. Taous Feroukhi, Resident Representative of Algeria to the IAEA.

members of the Board expressed the view that the Advisory Committee had discharged its mandate and that there was no need to extend it. Several members expressed the view that efforts to strengthen the safeguards system must be an ongoing process and that the Agency should continue to work actively towards strengthening the safeguards system. Several members expressed the view that some of the issues and recommendations discussed by the Committee could be taken up in the future for further consideration as appropriate. At the conclusion of its deliberations under this Agenda item, the Board of Governors took note of the report of the Advisory Committee.

4. The tenth IAEA Symposium on International Safeguards was held in Vienna from 16 to 20 October 2006. More than 500 experts from over 60 States addressed safeguards issues organised under five topics: current challenges to the safeguards system; further strengthening safeguards practices and approaches; improving the collection and analysis of safeguards information; advances in safeguards techniques and technology; and future challenges. Participants emphasised the importance of strengthening the overall framework of safeguards, including: encouraging States to bring additional protocols (APs) into force; developing tools to help identify clandestine transfers of sensitive nuclear technology; and fostering greater understanding of safeguards through better education.

B.1. Drawing Safeguards Conclusions: The Further Development of the State Evaluation Process

5. As reported in the Safeguards Statement of the Agency for 2006, safeguards were applied in that year for 162 States with safeguards agreements in force with the Agency⁴. The Secretariat's findings and safeguards conclusions for 2006 derive from an evaluation of all the information available to the Agency in exercising its rights and fulfilling its safeguards obligations for that year. The conclusions were reported by type of safeguards agreement and corresponding safeguards obligations. This format, which was first introduced in the 2005 Safeguards Implementation Report, has been well received by the Board of Governors. It provides clarity in the way in which the Secretariat presents its safeguards conclusions and supporting material in the annual Safeguards Implementation Report⁵.

6. The Secretariat continued to develop the State-level concept for the implementation and evaluation of safeguards. In the State-level concept, safeguards implementation and the evaluation of that implementation are based on a State-level approach (SLA), developed for each State. SLAs are developed on a non-discriminatory basis using safeguards verification objectives which are common to all States with comprehensive safeguards agreements (CSAs). They also enable State-specific features, such as the State's nuclear fuel cycle and the effectiveness of its State system of accounting for and control of nuclear material (SSAC), to be factored in. As of June 2007, State-level integrated safeguards (IS) approaches were being implemented for 17 States.

7. In resolution GC(50)/RES/14, the General Conference welcomed efforts to strengthen safeguards, including the Secretariat's activities in verifying and analysing information provided by Member States on nuclear supply and procurement, taking into account the need for efficiency, and invited all States to cooperate with the Agency in this regard. Obtaining information on the procurement and supply of sensitive nuclear technology aims to enable the Agency to increase its understanding of covert nuclear trade activities, on a transnational basis, for safeguards purposes. The Secretariat has continued to analyse nuclear trade related information provided by Member States with a view to contributing to the State

⁴ And Taiwan, China.

⁵ The Safeguards Statement for 2006, Background to the Safeguards Statement and Executive Summary of the Safeguards Implementation Report for 2006 are published on the IAEA website at <http://www.iaea.org/OurWork/SV/Safeguards/es2006.html>.

evaluation process. In this regard, a number of Member States have agreed to facilitate the provision of safeguards-relevant information to the Agency by their nuclear-related industries.

B.2. Development and Implementation of Safeguards Approaches, Procedures and Technology

8. The Secretariat continued to rely on Member State Support Programmes (MSSPs) for safeguards research and development (R&D) activities and for safeguards implementation support. As of 30 June 2007, there were 20 MSSPs⁶ to which the Secretariat communicates its R&D and safeguards implementation objectives through its biennial Research and Development Programme for Nuclear Verification. MSSPs are crucial to the Secretariat's plans to develop new safeguards concepts and to make use of new technologies to meet the safeguards challenges of the future. Of particular importance in this regard is the Secretariat's project, supported by 12 Member States and by the European Commission, to identify and develop effective and appropriate advance technologies for the detection of undeclared nuclear material and activities. In recognition of the growing use of laser methods for rapid on-site analysis of material, elements and isotopes, a technical meeting on laser spectrometry was held in Vienna from 28 August to 1 September 2006. Other important meetings included: the second Coordinated Technical Meeting on the Future of Sealing and Containment Verification Methods, held in February 2007, which provided valuable insight into emerging technologies that could be used to develop tamper indicating systems; and two workshops, one on Advanced Sensors and the other on Multiplicity Counters, both held in April 2007.

9. Another important project, currently supported by 9 Member States participating in the Application of Safeguards to Geological Repositories (ASTOR) Group of Experts, is the development of generic IS concepts for geological repositories and safeguards techniques applicable to specific geological repository sites. The ASTOR group held meetings in October 2006 and June 2007, and has provided valuable support to the Secretariat's efforts to develop a model IS approach for geological repositories.

B.2.1. Safeguards Approaches

10. The Agency has continued to develop new and improved safeguards approaches. Safeguards approaches using remote monitoring capabilities result in the enhanced effectiveness and efficiency of safeguards implementation. In this context, as of 30 June 2007, safeguards equipment with remote monitoring capabilities had been installed in 75 facilities in 16 States⁷. As for facility-specific safeguards approaches, an approach based on randomized unannounced inspections and remote monitoring to verify spent fuel transfer from an on-load reactor (OLR) to dry storage facilities was implemented at two OLR sites, resulting in considerable savings in inspection effort; a field-trial of a remote monitoring system based on surveillance and radiofrequency seals was successfully completed at a plutonium storage facility, and the system approved for implementation; the development and implementation of short notice random inspection regimes for depleted, natural and low enriched uranium fuel fabrication and conversion plants continued; and a safeguards approach was approved for a new commercial enrichment plant. Implementation procedures were tested during the commissioning of the first cascade.

11. Discussions and consultations continued between the Agency and the relevant Japanese authorities with a view to refining the inspection procedures for the Rokkasho Reprocessing Plant. The development

⁶ Argentina, Australia, Belgium, Brazil, Canada, the Czech Republic, the European Commission, Finland, France, Germany, Hungary, Japan, the Netherlands, the Republic of Korea, the Russian Federation, South Africa, Spain, Sweden, the United Kingdom and the United States of America.

⁷ And in Taiwan, China.

of a safeguards approach for J-MOX (a Japanese plant for fabrication of mixed oxide fuel for light water reactors) was initiated as part of the approach for the site.

B.2.2. Information Technology

12. The Agency has continued to work on the IAEA Safeguards Information System Re-engineering Project (IRP). The objective of the IRP is to increase the effectiveness and efficiency of information processing by replacing the current information environment with a modern, analysis-friendly integrated information system. The project will ensure better process support, integration and accessibility to data, information and knowledge, including, when appropriate, remote access by field offices and safeguards inspectors. When complete, it is anticipated that the new system will not only serve current needs but will also be flexible enough to adapt to future challenges. IRP implementation began in July 2005, with the assistance of a commercial contractor, and comprises three phases. Phase I (Solution Design) has been completed. Phase II (Foundation) focusing, inter alia, on the installation of the physical architecture and developing the common building blocks for all future safeguards applications, is practically completed (all deliverables have been submitted) and are about to be accepted by the Agency. Phase III (Implementation) has started and will implement the re-engineered, re-developed and custom developed applications which make up the Agency's Safeguards Information System. The Implementation projects are divided into four business areas: State Supplied Data, Analysis, Verification and Support. State Supplied Data and Support projects were officially started in June 2007. Phase III projects are expected to be completed by 2010.

13. The volume and diversity of information collected and analysed by the Secretariat for safeguards State evaluations continue to grow substantially. The nVision project aims to define an information analysis architecture and the necessary supporting tools to improve the Agency's ability to analyse information. The nVision project will be fully coordinated with the IRP Phase III Analysis Projects, in order to ensure full integration within the Safeguards Information System. All development projects will be fully coordinated with the re-engineering effort in order to establish a single, integrated information system, and make information readily available within a consolidated infrastructure. Concurrently, an overarching and ongoing task will be to enhance information security in order to ensure adequate protection of safeguards-related information.

B.2.3. Safeguards Equipment

14. Since last year's report to the General Conference, the further development and implementation of new equipment has continued in a number of areas. In the area of non-destructive assay (NDA), a new system (hardware and software) has been established and is being routinely used to calibrate various detector systems. In addition, a portable laser spectrometry system which could help to detect the presence of gases associated with uranium enrichment was demonstrated successfully.

15. Between 1 July 2006 and 30 June 2007, a further 48 digital surveillance systems were installed in new facilities and as part of the ongoing effort to replace obsolete systems. The development of the next generation surveillance system moved forward as planned and the system is scheduled for initial implementation in late 2009. By the end of June 2007, the Secretariat was managing 1021 cameras connected to 555 systems at 240 facilities in 33 States⁸.

16. Implementation of the Electronic Optical Sealing System (EOSS) continues. More than 600 EOSS seals have been received and the first such seals for routine safeguards use were available in February 2007. The enhanced Cobra seal reader prototype was received in early May 2007. In connection with

⁸ And in Taiwan, China.

feasibility studies on new sealing systems and containment verification techniques, the Agency has identified three areas for further development: a laser surface authentication method for metal seal verification; laser surface mapping for weld identification and/or containment verification; and electrical conduit monitoring by sensing attempts to tamper with the conduit and/or with the internal wires carrying safeguards information.

17. Since last year's report to the General Conference, unattended monitoring systems continued to be installed or upgraded. By the end of June 2007, there were 140 surveillance and radiation monitoring systems with remote transmission capabilities authorized for routine use: 91 surveillance systems (with 326 cameras) in 15 States⁹ and 49 unattended radiation monitoring systems in 8 States. 103 of the 140 systems were transmitting safeguards data and 37 systems were transmitting only equipment 'state of health' data.

18. The Secretariat continued to cooperate with the European Space Agency (ESA) on the efficient establishment and effective use of a satellite network. The Agency and ESA have jointly produced a document which outlines future technical assistance which could be provided to the Agency on satellite-based services. To support this effort, four Member States have agreed to participate in assessing the use of the network for remote monitoring and inspection support.

19. In early 2007, with the support of the Government of the Republic of Korea and of the Korea Atomic Energy Research Institute (KAERI), the Agency installed and tested a point-to-point secure communication system, which includes a satellite link, between Daejeon in the Republic of Korea and Agency Headquarters in Vienna. The design layout of the communication system has been developed to support the potential need of the Agency to establish a secure means of communication in locations where access to traditional means (phone lines, internet, wireless) is costly, unreliable or non-existent.

B.2.4. Sample Analysis

20. The Agency's Safeguards Analytical Laboratory (SAL) in Seibersdorf is essential to nuclear material verification and environmental sample analysis. The Agency aims to maintain and enhance its capabilities in this area, including through: upgrades of the infrastructure of the nuclear material laboratory at SAL; expansion of the capacity and capability to process and analyse environmental samples at SAL; and expansion of the capacity and capability of the Agency's Network of Analytical Laboratories (NWAL) through the qualification of additional environmental sampling laboratories to be included in the NWAL and/or by enhancing the capability of current network laboratories.

21. Environmental sampling has proven to be one of the most effective measures in detecting undeclared nuclear material and activities. However, significant delays continue to be experienced in the analysis, evaluation and reporting of environmental sample results. These delays affect the promptness of follow-up on safeguards significant findings arising from the State evaluation process and the drawing of safeguards conclusions, especially when sample analysis is key to clarifying a finding or supporting a conclusion. The Agency's goal is to reduce sample processing time from the current average level of eight months to three months: one month for shipping and distribution to the NWAL, one month for sample analysis and one month for evaluating and reporting the results. Meeting this goal would require an increase in the number and/or capacity of relevant laboratories in the network, a substantial improvement in the capability of SAL, and an increase in the number of staff involved in the evaluation and reporting of the results.

⁹ And in Taiwan, China.

B.3. Cooperation with State Systems of Accounting for and Control of Nuclear Material

22. SSACs are fundamental to effective and efficient safeguards implementation. States need legislative and regulatory systems to exercise necessary regulatory and control functions. SSACs for States with significant nuclear activities may also need the technical and analytical ability to perform nuclear material measurements to enable them to meet their safeguards obligations. The IAEA SSAC Advisory Service (ISSAS) was initiated in 2005 to provide Member States with advice and recommendations for establishing and strengthening their SSACs. Upon the request of the Governments concerned, ISSAS missions have been conducted, since last year's report to the General Conference, in Serbia, Singapore and Switzerland. The Agency has accepted requests for ISSAS missions from Armenia, Niger, Romania and Ukraine, which will be conducted in 2007–2008.

23. Since July 2006, the Agency has conducted 10 national, regional and international training courses for State personnel where assistance was provided to enable States to fulfil their obligations under safeguards agreements and APs. These included: two training courses in Vienna for SSAC representatives, a training course for States with CSAs and SQPs held in Tajikistan, a regional technical meeting on AP implementation for European Union States held in Lithuania, an interregional training course on SSACs held in the United States, two regional training courses on SSACs held in Argentina and Japan and three national training courses held in Egypt, the Republic of Korea and Singapore.

B.4. Training

24. Effective and efficient safeguards implementation depends, inter alia, on well trained staff with the necessary skills. The safeguards training curriculum has been further developed. An Introductory Course on Agency Safeguards (ICAS) for new inspectors was held twice in the past year. Other basic training for inspectors included comprehensive inspection exercises at light water reactors and at bulk handling facilities, enhanced observational skills and enhanced communications skills. Advanced training was provided on complementary access principles and practices (both for inspectors and for support staff), enrichment technology, satellite imagery, proliferation indicators, spent fuel verification, plutonium verification techniques and tank calibration. Additionally, AP exercises were held in Hungary, the Joint Research Centre of the European Commission at Ispra, Italy, and the United States; visits took place at uranium mines in the Czech Republic; and refresher training was provided for inspectors on NDA and containment and surveillance equipment and procedures. Training for support staff has also been expanded.

B.5. Quality Management

25. Progress has been made in implementing a comprehensive quality management system (QMS) in the Department of Safeguards. This has focused on increasing staff awareness and training and on implementing a number of requirements of ISO standard 9001:2000—Quality Management Systems, specifically those relating to improvements. In the former context, QMS training was made mandatory for all staff of the Department and, as of June 2007, more than 90% of the staff of the Department had attended at least an introductory course on quality management. In the latter context, an internal quality audit process was inaugurated in January 2006 and a total of 8 quality audits had been carried out by June 2007. Additionally, a number of continual process improvement working groups have been established and the Department of Safeguards has introduced formal review of the QMS on a regular basis.

C. Additional Protocol Implementation and Integrated Safeguards

C.1. Additional Protocol Implementation

26. APs based on the Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards in document INFCIRC/540 (Corr.) (Model Additional Protocol) are central to the Agency's ability to detect possible undeclared nuclear material and activities and to draw soundly-based safeguards conclusions with regard to their absence. The Secretariat has continued its efforts to implement APs and has invested considerable resources in the analysis, evaluation and follow-up of declarations made under APs.

27. The Secretariat has also continued to help States to understand and discharge their own responsibilities under APs. An AP requires a State to provide the Agency with a wide range of information about its nuclear material, activities and plans and to provide the Agency with complementary access to locations in the State. To help States to meet these obligations, the Secretariat has held substantive consultations on AP implementation issues with representatives of numerous States since 1 July 2006.

28. Under the Model Additional Protocol, initial Article 2 declarations are due within 180 days of the entry into force of an AP, annual updates are due by 15 May of the following years, and quarterly declarations are due within 60 days of the end of each quarter. In the last year, the number of declarations received under APs has increased by 7.1%. Most of the declarations from the 82 States with APs in force were submitted on time or with only minor delays. However, about 15% of the declarations were received with more than 30 days' delay and some were delayed for up to 1148 days. Moreover, AP declarations for 2006 or earlier were outstanding for 22 States. In some cases, the absence of, or substantial delay in submitting declarations, has impacted significantly on the Agency's evaluation process for drawing the broader safeguards conclusion.

C.2. Integrated Safeguards

29. The implementation of IS offers the best opportunity for increased effectiveness and enhanced efficiency. Particularly noteworthy in this regard, yielding both effectiveness and savings, are randomly scheduled inspections with no notice or short notice to the State. General Conference resolution GC(50)/RES/14 requested the Secretariat to continue to extend the implementation of IS on a priority basis in an effective and cost-efficient manner. As stated in paragraph 6 above, the Secretariat continued to develop further the State-level concept for the implementation and evaluation of safeguards, including the drafting of Annual Implementation Plans (AIPs) for those States for which the broader conclusion has been drawn. In 2006, IS were being implemented for the entire year in nine States: Australia, Bulgaria, Hungary, Indonesia, Japan, Norway, Peru, Slovenia and Uzbekistan. IS have also been initiated in Bangladesh, Canada, the Czech Republic, Ghana, Latvia, Lithuania, Romania and Poland. In 2006, there was an increase of the verification effort in Japan because of the commissioning of the Rokkasho Reprocessing Plant. Excluding that effort, the implementation of IS elsewhere is estimated to have resulted in savings of about 280 person-days of inspection (PDIs) in 2006. Additional substantial savings in inspection effort are being achieved in 2007 with the implementation of IS in Canada.

D. The Conclusion and Entry into Force of Safeguards Agreements and Additional Protocols

30. Between 1 July 2006 and 30 June 2007, CSAs entered into force for two additional States¹⁰ and APs for seven States¹¹. Two States acceded to the safeguards agreement between the non-nuclear weapon States of the European Union, EURATOM and the Agency, and to the protocol additional thereto¹². During the same period, one State signed a CSA¹³ and five States signed APs¹⁴. Five States agreed to modify their respective Small Quantities Protocols (SQPs)¹⁵ in keeping with the Board of Governors' decision of 20 September 2005 regarding SQPs and one State¹⁶ agreed to rescind its SQP.

31. As of 30 June 2006, 162 States had safeguards agreements in force with the Agency and 82 of these States — including 79 with CSAs — also had APs in force. Thus, ten years after the Board of Governors approved the Model Additional Protocol¹⁷, more than half of all States with safeguards agreements have brought APs into force. With regard to the 73 States which have significant nuclear activities, 60 such States have signed APs and 50 have brought APs into force.

32. Conversely, 31 non-nuclear weapon States party to the NPT have not yet brought CSAs with the Agency into force in connection with that Treaty, and 111 States — including 23 States with significant nuclear activities¹⁸ — have not yet brought APs into force. The latest update of the status of safeguards agreements and APs is published on the IAEA website¹⁹.

D.1. Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols

33. In operative paragraph 22 of resolution GC(50)/RES/14, the General Conference “notes the commendable efforts of some Member States, notably Japan, and the IAEA Secretariat in implementing elements of the plan of action outlined in resolution GC(44)/RES/19 and the Agency's updated plan of action (September 2006), and encourages them to continue these efforts, as appropriate and subject to the availability of resources, and review the progress in this regard, and recommends that the other Member States consider implementing elements of that plan of action, as

¹⁰ Botswana, Oman.

¹¹ Botswana, Fiji, Kazakhstan, Libyan Arab Jamahiriya, Niger, Nigeria, the former Yugoslav Republic of Macedonia.

¹² Poland, Slovenia; as a result of these States' accession to INFCIRC/193, the implementation of safeguards pursuant to their bilateral comprehensive safeguards agreements and additional protocols was suspended.

¹³ Botswana.

¹⁴ Botswana, Fiji, Kyrgyzstan, Liechtenstein, Senegal.

¹⁵ Azerbaijan, Costa Rica, Dominican Republic, Holy See, Seychelles.

¹⁶ Jamaica.

¹⁷ In May 1997.

¹⁸ Algeria, Argentina, Belarus, Brazil, Colombia, Democratic People's Republic of Korea, Egypt, India, Iraq, Islamic Republic of Iran, Israel, Malaysia, Mexico, Morocco, Pakistan, Philippines, Russian Federation, Serbia, Syrian Arab Republic, Thailand, United States of America, Venezuela, Vietnam.

¹⁹ <http://www.iaea.org/OurWork/SV/index.html>.

appropriate, with the aim of facilitating the entry into force of CSAs and APs.” 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 that have substantial 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.

The latest update of the Agency’s Plan of Action is published on the IAEA website²⁰.

34. 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 Strategy²¹, the Secretariat has continued to encourage and facilitate wider adherence to the strengthened safeguards system. A paper regarding the challenges faced by the Agency in this regard was presented at the IAEA Symposium on International Safeguards which took place in Vienna in October 2006.

35. In order to facilitate the conclusion and implementation of APs and the implementation of the Board’s decision on SQPs, the Secretariat convened two outreach events during the past year: the *IAEA Regional Seminar on Verifying Compliance with Nuclear Non-Proliferation Commitments: Strengthened Safeguards, Additional Protocols and Small Quantities Protocols* held in Sydney, Australia, in July 2006, for States of East Asia and the Pacific with no or only limited nuclear activities; and the *IAEA Seminar for High Level Officials on the Multilateral Verification of Nuclear Non-Proliferation Undertakings Pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons*, held in Vienna, from 14 to 16 May 2007 for States party to the NPT which had not yet concluded CSAs with the Agency pursuant to the Treaty. In conjunction with these seminars, the Secretariat held bilateral consultations with 35 States on the conclusion of safeguards agreements and APs and/or on the amendment of SQPs.

²⁰ <http://www.iaea.org/OurWork/SV/Safeguards/sv.html>.

²¹ Contained in document GOV/2005/8.