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

Introduction

1. In resolution GC(46)/RES/12, the General Conference requested the Director General to report to the forty-seventh session on strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol[1]. This report responds to that request, updates the information given in last year's report to the General Conference (document GC(46)/8) on this agenda item and covers: the implementation and further development of safeguards strengthening and efficiency measures; additional protocol implementation and integrated safeguards; and the conclusion and entry into force of safeguards agreements and additional protocols.

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

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

2. The drawing of safeguards conclusions is based on a State evaluation process in which all information available to the Agency about a State's nuclear and nuclear related activities is assessed. In the light of the increasing number of State evaluation reports being prepared and reviewed, and their importance in drawing safeguards conclusions, this process has been restructured and streamlined to ensure that State evaluations will continue to be conducted thoroughly and consistently, and that the

[1] Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards, INFCIRC/540 (Corrected).

results will receive an adequate level of attention and review. High level management review is directed to the most critical issues, to recommendations for key follow-up activities and to overall State evaluation conclusions leading to the safeguards conclusions. The introduction of this restructuring went smoothly. Since the report to last year's General Conference, the Secretariat has prepared and reviewed a further 64 State evaluation reports[2] of which 27 covered States with additional protocols in force.

3. As part of the continuing effort to improve the State evaluation process, guidance for the content and format of State evaluation reports has been substantially revised in the light of experience to ensure that the analytical process fully supports the recommendations made and conclusions drawn.

4. The information evaluated about each State and its nuclear fuel cycle characteristics, activities and plans is obtained: from the State itself, under the reporting requirements in its safeguards agreement and, more extensively, under an additional protocol, when implemented, or under voluntary arrangements; by Agency safeguards inspectors in the course of their inspections, complementary access and other verification activities; from open sources such as professional journals, commercial satellite imagery and the media; and from other sources of safeguards relevant information available to the Agency. During the past year, new and supplementary open sources of information about States' nuclear activities have been factored into the evaluation process and new software tools were introduced to facilitate the management and analysis of the additional information being obtained.

A.2. Improving Safeguards Implementation

5. Through performance evaluation, the Secretariat identifies problems in safeguards implementation and establishes a consolidated action plan for improvement. Actions on problems that have a significant impact on safeguards effectiveness and resource utilization are given a high priority. During the past year, priority continued to be given to resolving cases of prolonged non-attainment of inspection goals at some facilities. Through co-operation between the Secretariat, Member States and facility operators, progress was made in implementing new safeguards measures and installing new safeguards equipment to resolve these problems. This included the development and installation of equipment to monitor the flow of irradiated fuel at several on-load refuelled reactors; advanced thermohydraulic power monitors for several research reactors; and a radiation scanner for waste drums. A problem area, in which substantial improvement has been achieved over the past several years, is inconclusive containment and surveillance results. This has continued during the past year with the installation of newer generation equipment, the improvement in equipment reliability and the application of further back-up measures on reactor cores. Progress was also made on reducing the cases where spent fuel in shipping casks cannot be verified. This can be achieved through improved advance notice procedures and changes in surveillance coverage and sealing, but more needs to be done in this regard.

A.3. Implementation of Efficiency Measures

6. The Agency continued to make every effort to achieve savings through the implementation of a variety of efficiency measures. In the areas of verification activities in the field, measures were taken towards reducing inspection effort in facilities by introducing unattended and remote monitoring systems where studies have demonstrated that it would be cost beneficial. In the area of information processing and technology, new tools for accessing information and reporting of verification activities have been introduced, and communication costs between facilities and Agency Headquarters have been reduced. In the area of organization, management and procedures, arrangements have been made

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[2] The Secretariat also reviewed an evaluation report on the nuclear programme of Taiwan, China.

with some State systems of accounting for and control of nuclear materials (SSACs) for joint procurement, use and maintenance and cost sharing of inspection equipment; procedures were optimized for shipping samples from a State for destructive analysis; and scheduling was improved for technician trips for the maintenance and repair of equipment. Also, procedures were put in place for evaluating the effectiveness and efficiency of planned measures through cost benefit analyses, which provide a consistent basis for estimating the costs of different safeguards activities and approaches. In the area of Member State Support Programmes, the research and development tasks were rationalized to allow more focused management and to lower the administration costs. Further efficiency measures are described in paragraphs 7-12 below.

A.4. Development of Safeguards Approaches, Procedures and Technology

A.4.1. Safeguards Approaches

7. Efforts continued during the year to develop more cost-effective approaches to safeguarding spent fuel at both on-load refuelled reactors and light water reactors. Emphasis is being placed on more efficient verification of transfers to dry storage, which required some 13% of total Agency inspection effort in 2002. The safeguards approach for the conditioning and storage of spent fuel at the Chernobyl site in Ukraine was completed. Equipment has been procured and its installation and testing are underway. Work on developing and implementing the safeguards approach for the Rokkasho Reprocessing Plant in Japan proceeded according to schedule. As part of the safeguards strengthening process, the safeguards approach for natural uranium conversion facilities was revised to provide increased assurance that, through the use of design information verification (DIV) and nuclear material accountancy measures, facility operation is as declared. The procedures for implementing DIV throughout the life-cycle of all facilities under safeguards are being upgraded. Through the introduction of efficiency improvements, the inspection effort at an enrichment plant has been maintained despite a substantial increase in production since 1998.

A.4.2. Information Technology

8. The project to redesign and re-engineer the Agency's 20-year old IAEA Safeguards Information System (ISIS) moved towards realization, with the preparation of a detailed plan and the initiation of requests for bids. As an extension of the planning phase, a cost benefit analysis and a risk assessment have been conducted. Specific software making it easier to secure, manage and retrieve data and information related to additional protocol implementation, including complementary access data, has increased the efficiency of information review and analysis. The information security procedures in the Department of Safeguards were reviewed and a systems and communications information architecture, and related infrastructure with an improved level of security, were defined.

A.4.3. Safeguards Equipment

9. The Secretariat has continued, with Member State Support Programmes, to improve the equipment used during inspections and complementary access, and in an unattended mode at facilities. In the continuing move towards standardization, the Secretariat has reduced to three the number of different types of instruments for radiation monitoring and gamma spectral analysis. In equipment development, emphasis was put on improving spent fuel verification at a variety of facilities, which included addressing a long-standing spent fuel verification problem through the application of a specialized neutron measurement system for attribute verification in Argentina. Unattended monitoring systems using radiation detection and other types of sensors are increasingly being used in facilities to reduce inspection effort. With the resolution of the problem with radiation susceptibility of digital surveillance devices, the replacement of analogue surveillance systems has resumed and is

approaching completion; systems operating in a remote monitoring mode are now in use in seven States and in Taiwan, China. The development and testing of improved sealing systems continued.

A.4.4. Environmental Sampling

10. Environmental sampling and analysis is now in routine use, with over 200 swipe samples being taken annually at enrichment plants and other installations, including facilities with hot cells. In addition, environmental sampling is playing an important role in conjunction with the additional protocol, with the number of samples taken during complementary access reaching 100 per year. Since last year's report to the General Conference, the capacity and capability to analyse environmental samples was increased through the acceptance of one new laboratory in the Agency's Network of Analytical Laboratories, which now includes 14 laboratories in 8 States and 1 European Union laboratory. Improvements continued to be made in sampling procedures and analytical techniques. Three environmental sampling field trials continued during the year, using air particulate sampling at enrichment and reprocessing facilities. These trials are giving the Agency experience in deploying air samplers and helping it to identify analytical requirements.

A.5. Increased Co-operation with SSACs

11. An effective SSAC is fundamental to the implementation of effective and efficient safeguards in a State, and for a State to meet its international obligations to account for and control nuclear material. In the past year, progress continued to be made in developing further co-operation with several States and regional organizations, with emphasis on helping States to evaluate and, if necessary, upgrade their SSACs, and in working with States to enable more effective and efficient Agency inspections. Visits were made to several States to identify assistance needs for SSAC development. In the Agency's programme and budget for 2004–2005, these SSAC support activities have been formulated as a recurrent project, which includes updating guidelines to improve the effectiveness of SSACs at the State and facility level, performing advisory missions for the evaluation of SSACs, providing co-ordinated technical support for SSAC improvements, and conducting training for SSAC personnel.

12. Under the co-operation arrangements with Japan, a joint-use procedure for verification of spent fuel using improved Cerenkov viewing devices was implemented, reducing Agency inspection effort at light water reactors. Under the co-operation arrangements with the SSACs of the Republic of Korea, South Africa and Switzerland, the use of remote monitoring and unannounced interim inspections were implemented, reducing Agency inspection effort. The Agency's co-operation with Euratom focused on preparations for additional protocol implementation in non-nuclear-weapon and nuclear weapon States of the European Union, through a joint working group with Euratom. Joint field trials were conducted in Finland and the Netherlands in order to test important aspects of additional protocol implementation, including the definition of sites, procedures for information flow and conduct of complementary access. Under the co-operation arrangements with the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), new procedures for common use of equipment were developed.

A.6. Training and Support Activities

13. In the further enhancement of the safeguards training curriculum, new sessions were included and others were updated in the Introductory Course on Agency Safeguards, which was held twice since last year's session of the General Conference for 25 new inspectors. Other inspector training included basic and refresher courses and specialized courses on such topics as environmental sampling, State evaluation, satellite imagery and complementary access. Training for individuals in Member States was increased to cover wider regional areas and ten events were conducted at the national, regional and interregional levels. A revised edition of the IAEA Safeguards Glossary was issued in 2002,

reflecting the changes and additions in terminology as a result of advances in strengthening the Agency's safeguards system since the last update in 1987.

B. Additional Protocol Implementation and Integrated Safeguards

B.1. Additional Protocol Implementation

B.1.1. Consultations with States

14. Under an additional protocol, a State is required to provide the Agency additional information about its nuclear programme and give the Agency complementary access. To assist States in preparing to meet these new obligations, the Secretariat held technical consultations on additional protocol issues with over 50 States and regional organizations since last year's report to the General Conference. These consultations also enabled the Secretariat to better understand issues of concern to States. Topics discussed with States without additional protocols in force centred on the work needed to prepare for additional protocol implementation such as: ensuring that the necessary legal infrastructure and legislative framework are in place; how best to equip SSACs with the capacity and expertise required to underpin and to co-operate with the Agency in additional protocol implementation; and the importance of full support in this endeavour by government authorities and nuclear facility operators. Consultations with States with additional protocols in force, but which had not yet submitted the initial declaration required of them by Article 2, clarified the requirements for timing, content and formatting of declarations.

B.1.2. State Declarations under an Additional Protocol

15. Since last year's report to the General Conference, 29 States and Taiwan, China, have submitted additional protocol declarations, 5 of which were initial Article 2 declarations. The declarations were generally submitted in a timely manner, although some were more than a month late and a few, close to a year. To assist States with the electronic submission of declarations, the Protocol Reporter software has been distributed to 44 States. However, to date only 12 States are using it. In 2002, 18 States submitted additional protocol information in hard copy, which increases the work to process declarations. Wider use of the Protocol Reporter would facilitate the State's work and that of the Secretariat.

16. The review of the declarations has often required further contact with State authorities to obtain amplifications or clarifications of the information provided. For initial declarations, the information provided under Article 2.a.(iii) (buildings on a 'site') generated a large number of requests for supplementary information. The 'use' and 'contents' of buildings were not always clearly described, or site maps needed improvement or appeared to be inconsistent with other references, and entries did not always accord with descriptions provided under the safeguards agreement (in design information questionnaires). Also the information submitted under other provisions needed some amplification or clarification in many cases. Where necessary, the Secretariat raised questions or inconsistencies with State authorities (pursuant to Article 4.d of their additional protocols). Some of the matters addressed in this category were satisfactorily resolved. Others have yet to be. In the majority of these communications, States provided timely and satisfactory responses to the Secretariat. In some instances, however, responses were incomplete, generated further questions, were received late or are still awaited. On balance, the experience has been good, but it has shown that States need to pay

careful attention to all of the information required under an additional protocol and that the Secretariat needs to be as clear as possible in the guidance it makes available to States for these purposes.

17. Guidelines were issued by the Agency in 1997 to assist States with the preparation of protocol declarations. These guidelines have proved to be effective in explaining the information and the appropriate level of detail that is required, and in providing a standardized reporting format. However, a number of recurrent reporting problems have arisen. Therefore, a revision of the guidelines has been prepared during the past year and will be issued following a review with States later this year.

B.1.3. Complementary Access

18. Complementary access performed under an additional protocol is playing an important role in the process of drawing and reaffirming conclusions on the absence of undeclared nuclear material and activities. Since last year's report to the General Conference, complementary access was conducted 81 times in 15 States and in Taiwan, China. In most cases Agency inspectors did not encounter difficulties in conducting complementary access and benefited from good co-operation from State authorities and facility operators. The instances of delay or partial or restricted access that did occur were taken up with State authorities and resolved satisfactorily in most cases. The Secretariat communicated further questions and inconsistencies to the States in a few cases.

B.2. Integrated Safeguards

19. Last year's report to the General Conference reported on the completion of the conceptual framework for integrated safeguards that was presented to and taken note of by the Board of Governors in March 2002. The conceptual framework comprises the safeguards concepts, approaches, guidelines and criteria that govern the design, implementation and evaluation of integrated safeguards. During the past year, the further development of the elements of the conceptual framework focused largely on implementation aspects. Guidelines were prepared for the use of unannounced and short notice inspections, and for the handling of anomalies, questions and inconsistencies in integrated safeguards. Based on the integrated safeguards approaches developed in 2001, provisional implementation criteria were completed for research reactors and spent fuel storage facilities, and development began on other integrated safeguards criteria. A methodology was introduced for estimating costs of integrated safeguards implementation.

20. The implementation of integrated safeguards in Australia continues for the third successive year. Substantial progress was made in designing integrated safeguards approaches and preparing for implementation in other States with additional protocols in force. Trials were carried out in Norway of unannounced inspections performed as foreseen in the integrated safeguards approach, and implementation of integrated safeguards began on a provisional basis. In preparation for implementing the integrated safeguards approach in Indonesia, surveillance systems are being upgraded and procedures for short notice random inspections at a research reactor facility are being tested. State-specific integrated safeguards approaches are under development for several States with small or moderate nuclear activity. For States with large nuclear fuel cycles, model integrated safeguards approaches developed for light water reactors, on-load refuelled reactors and research reactors and critical assemblies are being adapted. Trials are under way of the integrated safeguards approach for light water reactors in Japan.

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

21. Since the report to last year's General Conference, the number of safeguards agreements and additional protocols signed or in force has increased. The total number of States with safeguards agreements has reached 147, with the entry into force of comprehensive safeguards agreements for four additional States[3], while five States have signed such agreements[4]. In addition, the validity of Albania's *sui generis* safeguards agreement in the context of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was confirmed by an exchange of letters. Two new State Parties to the NPT initiated negotiations on their comprehensive safeguards agreements with the Agency[5]. Meanwhile, additional protocols were signed by ten States[6] and entered into force for nine States[7]. As regards the collective entry into force process of the European Union, three additional European Union States[8] informed the Secretariat that their domestic requirements for the entry into force of their respective additional protocols have been met; three have not yet informed the Agency that the process has been completed. In the final declaration of the European Council Summit at Thessaloniki, the European Union committed to bringing their additional protocols into force before the end of 2003.

22. Even though such incremental progress is welcome, overall progress continues to lag well behind expectations. By 17 July 2003, more than six years after the Board approved the Model Additional Protocol, only 74 States have signed additional protocols, and less than half of those (35 States) have brought their protocols into force[9]. Out of the States party to the NPT, 47 have yet to bring into force comprehensive safeguards agreements with the Agency pursuant to that Treaty, and 86 out of 161 States having concluded safeguards agreements have yet to sign additional protocols to those agreements. This figure includes 21 States with significant nuclear activities. For the Agency to be able to give credible assurance about the non-diversion of nuclear material and the absence of undeclared nuclear material and activities, it must be given the requisite authority. This will require that all States having made non-proliferation commitments, in particular those with significant nuclear activities, bring into force and implement the legal instruments of the strengthened safeguards system.

23. In 1992, the Board discussed the early provision and use of design information (see document GOV/2554/Att.2/Rev.2) and the Agency's continuing right to verify design information for facilities. The Board called upon all parties to comprehensive safeguards agreements to provide the information described in the document and requested the Secretariat and all the parties to adapt, where appropriate, the related subsidiary arrangements. By the end of February 2003, all relevant States had done so.

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3 Burkina Faso, Georgia, Mali, Yemen.

4 Burkina Faso, Mali, Mauritania, Tajikistan, United Arab Emirates.

5 Cuba, Timor-Leste.

6 Burkina Faso, Chile, D.R. Congo, Jamaica, Mali, Malta, Mauritania, Paraguay, South Africa, Tajikistan.

7 Burkina Faso, Cyprus, D.R. Congo, Georgia, Jamaica, Kuwait, Mali, Mongolia, South Africa.

8 Belgium, Denmark, France.

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9 In addition, Ghana is implementing an additional protocol provisionally pending formal entry into force, and the measures of the Model Additional Protocol have been accepted by Taiwan, China.

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

24. At its forty-sixth session, the General Conference, in resolution GC(46)/RES/12, "note[d] the commendable efforts by 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 encourage[d] them to continue these efforts, as appropriate and subject to the availability of resources, and review the progress in this regards, and recommend[ed] that the other Member States consider implementing elements of the plan of action, as appropriate, with the aim of facilitating the entry into force of comprehensive safeguards agreements and additional protocols". Among the elements of the plan of action proposed in GC(44)/RES/19, are the following:

- Intensified efforts by the Director General to conclude safeguards agreements and additional protocols, 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 additional protocols; and
- Reinforced co-ordination between Member States and the Agency Secretariat in their efforts to promote the conclusion of safeguards agreements and additional protocols.

25. Guided by relevant GC resolutions, Board instructions and the Medium Term Strategy contained in document GOV/1999/69, the Secretariat has stepped up its efforts to encourage wider adherence to the strengthened safeguards system.

26. To this end, the Secretariat convened sub-regional seminars on the strengthened safeguards system in Romania (January 2003), Malaysia (March/April 2003) and Uzbekistan (June 2003), with financial support from the Governments of Japan and the United States of America. In-kind contributions were provided by the host governments as well as Australia, China, Finland, Japan, Ukraine and the USA. Japan hosted an important meeting in December 2002, entitled "International Conference on Wider Adherence to Strengthened IAEA Safeguards". The Chairman's summary included a number of steps to be taken, including the formation of the 'Friends of the Additional Protocol'. A meeting for selected non-governmental organizations (NGOs), think tanks and media, held in Vienna in March 2003, co-funded by Japan, considered the strengthened safeguards system as well as other matters of nuclear non-proliferation and security. Presentations explaining the Agency's safeguards system were made in Annecy (March 2003) and in Geneva (May 2003) at seminars that involved the participation of Member States, other States and nuclear non-proliferation experts. National seminars on the additional protocol were held in Thailand (March 2003) and Malaysia (April 2003), and the strengthened safeguards system was an important focus for regional and interregional training courses for SSACs held in Japan (November/December 2002), USA (April/May 2003) and the Russian Federation (August/September 2002 and May/June 2003). An outreach booklet, which was first made available during the forty-sixth session of the General Conference, was used extensively in consultations, and is now available in five of the Agency's official languages.

27. In April 2003, the Secretariat updated its outreach strategy for encouraging wider adherence to safeguards agreements and additional protocols. The current plan distinguishes between three categories of States: Agency Member States with significant nuclear activities, Member States with no safeguarded material, and non-Member States. For each of these categories, the main obstacles for concluding safeguards agreements and additional protocols were identified and strategies were defined to help each category of States overcome these obstacles. This is to be achieved through a combination of tailor-made regional and country-specific approaches. As with earlier versions of the Secretariat's Action Plan, activities are proposed for implementation by the Agency, Member States or jointly. The

Agency's outreach activities are a joint undertaking of the Secretariat, in particular the Director General, the Department of Safeguards, the Office of Legal Affairs and the Departments of Technical Co-operation and Nuclear Safety and Security. It is co-ordinated by the Office of External Relations and Policy Co-ordination, with the help of the Liaison Offices in New York and Geneva. In the spring of 2003, the Secretariat gave presentations on its strategy to interested Vienna-based missions and to States and NGOs gathered in Geneva for the second session of the Preparatory Commission for the 2005 NPT Review Conference.

28. The Secretariat intends to continue its efforts in the coming years, together with Member States, in the hope that they will promote the adherence to comprehensive safeguards agreements and additional protocols by all States in order to realize the full potential of the Agency's strengthened safeguards system.