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STRENGTHENING THE EFFECTIVENESS AND IMPROVING THE EFFICIENCY OF THE SAFEGUARDS SYSTEM AND APPLICATION OF THE MODEL ADDITIONAL PROTOCOL

INTRODUCTION

1. In resolution GC(44)/RES/19(2000), the General Conference requested the Director General to report to the forty-fifth session on strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol.[1]

2. Work related to the implementation of strengthened safeguards measures is described in Section A below; the development of integrated safeguards in Section B; and the action plan for the promotion of safeguards agreements and additional protocols in Section C.

A. IMPLEMENTATION OF SAFEGUARDS STRENGTHENING MEASURES

Information Evaluation

3. Since last year, the process established to evaluate the substantially increased amount of information about States' nuclear programmes available to the Agency has been enhanced by: development of guidelines for reviewing State declarations; introduction of new software to organize and process information more efficiently; and the establishment of a commercial satellite imagery database.

4. The Secretariat has continued to evaluate all the information available on the nuclear activities of States with comprehensive safeguards agreements, including those with additional protocols. This includes: information submitted by States; information acquired through the Secretariat's verification activities; and other available information. In the first phase of the evaluation process, a baseline evaluation on a State's nuclear programme is performed, in most cases, before the State has an additional protocol in force. This evaluation is used in drawing a conclusion of the non-diversion of declared nuclear material and provides a foundation for the evaluation of the information submitted by the State pursuant to Article 2 of its additional protocol. As of the end of July 2001, the Secretariat had prepared and

[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).

reviewed baseline State evaluation reports on the nuclear programmes of a total of 54 States (and an evaluation report on the nuclear programme of Taiwan, China).

5. After a State has brought its additional protocol into force and submitted its initial Article 2 declaration, a broader State evaluation is conducted. During this phase, the Secretariat identifies: any areas where it considers there is a need for further amplification or clarification; any questions or inconsistencies which need to be resolved; and appropriate follow-up actions. The outcome and follow-up of these activities are central to the Secretariat's ability to reach, for the first time, a conclusion of the absence of undeclared nuclear material and activities in a State which has both a comprehensive safeguards agreement and an additional protocol in force. The duration of this phase depends on the complexity of a State's nuclear programme and the time required for follow-up activities. As of the end of July 2001, 18 States[2] had submitted information under Article 2 of their respective additional protocols and, as a result, are covered by the second phase of the State evaluation process. In addition, the Secretariat had prepared and reviewed evaluation reports for eight States which take into account the information submitted under Article 2.

6. The Secretariat updates and reviews the evaluations of the nuclear programmes of States with additional protocols on an annual basis to reassess earlier evaluation results on the basis of any new information available, including updated Article 2 declarations received from the State and results of ongoing inspection and complementary access activities. This ongoing evaluation is critical for maintaining the Agency's ability to reaffirm the conclusions of non-diversion of declared nuclear material and of the absence of undeclared nuclear material and activities. Baseline evaluations of the nuclear programmes of States which have not concluded an additional protocol are also re-assessed on a regular, but less frequent, basis, or in response to changing circumstances. To date, State evaluation reports have been revised, at least once, for 20 States.

Increased Inspector Access

Complementary Access

7. The Secretariat has continued to gain experience in the implementation of additional protocol measures, in particular complementary access. The necessary infrastructure for implementing complementary access was further developed through the establishment of internal guidelines for all types of locations specified in additional protocols. These guidelines are being implemented on a provisional basis and will be further developed as experience in applying them is gained. In addition, the Agency issued guidelines for the processing of complementary access data packages. As of the end of July 2001, complementary access had been conducted in 11 States (and Taiwan, China).

Implementation Trials

8. As foreshadowed in last year's report, pending entry into force of the additional protocol for the non-nuclear-weapon States of the European Union, implementation trials are under way in Finland and in the Netherlands. The objective of these trials is to test elements of the

[2] In addition, Taiwan, China, has also submitted the information elicited in Article 2 of the Model Additional Protocol.

additional protocol. EURATOM and Finland have submitted draft Article 2 declarations to the Agency for the Finnish site involved in the field trial. These have been evaluated and complementary access activities are being planned. Draft Article 2 declarations are being prepared for the site of the field trial in the Netherlands.

Advances in Safeguards Technology

Environmental Sampling

9. The Secretariat has continued to process and analyse environmental samples collected during routine inspections and design information verification (DIV) visits, in particular from enrichment plants and from installations with hot cells, and during complementary access pursuant to additional protocols. As of the end of July 2001, samples had been collected from 108 facilities in 50 States (and Taiwan, China) during routine inspections and DIV visits. In addition, samples were taken during complementary access in nine States (and Taiwan, China). In July 2001, an air sampling field trial began in the vicinity of a reprocessing plant in the United Kingdom to test elements of sampling, analysis and evaluation that would be applicable to both location specific and wide area environmental sampling. Discussions are also ongoing with the Russian Federation to host air sampling field trials.

Remote Monitoring

10. Remote monitoring involves the transmission to Agency Headquarters, or its field offices, of data from unattended safeguards equipment, e.g. from cameras and seals, installed in nuclear facilities. By the end of July 2001, 25 remote monitoring systems had been installed and were operating in six States. Measures involving remote monitoring are also being studied in the context of integrated safeguards approaches and will be included where the Agency considers it appropriate. Extensive research and development work on reducing the cost of data transmission is being conducted with the assistance of Member State Support Programmes (MSSPs).

Increased Co-operation with State and Regional Systems of Accounting for and Control of Nuclear Material

11. Co-operation with State and regional systems of accounting and control has always been an important element of Agency safeguards. Safeguards strengthening measures place an even greater emphasis on working closely with State and regional systems of accounting and control so as to increase verification effectiveness and cost efficiency, while preserving the Agency's capability to draw its own independent conclusions. Further progress has been made in this regard in a number of areas involving joint and shared activities: for example, with EURATOM, in inspection planning and the development of safeguards approaches; with ABACC, in the development of procedures for carrying out unannounced inspections; with the State System of Accounting and Control (SSAC) of Japan in the development of safeguards equipment and related software, and training in their use; and with the SSAC of the Republic of Korea in the implementation of safeguards at light water reactors. Increased co-operation with State and regional systems is also being considered as a possible factor in implementing integrated safeguards, taking into account State-specific conditions and the effectiveness of the SSAC. Conditions and procedures for co-operation with State and regional systems under integrated safeguards are being developed.

Safeguards Training

12. A course on the application of satellite imagery has been introduced to complement the current training curriculum that includes courses on environmental sampling, the nuclear fuel cycle and proliferation indicators, complementary access, enhanced observational skills and State evaluations.

B. DEVELOPMENT OF INTEGRATED SAFEGUARDS

13. Significant progress has been made in the development of integrated safeguards, in other words, integrating traditional nuclear material verification activities with new strengthening measures, including those of the additional protocol. The development work continues to be undertaken within the Secretariat: with the assistance of a group of experts designated by the Director General; with advice from the Standing Advisory Group on Safeguards Implementation (SAGSI); and with the help of a number of MSSPs. A detailed status report on the work was presented to the Board of Governors in November 2000 (GOV/INF/2000/26). Further, a briefing was provided immediately after the June 2001 Board of Governors meeting.

Current Work

14. The main focus of work on integrated safeguards currently is the detailed development of safeguards approaches for various types of nuclear facility, the State level approach concept, and implementation guidelines and criteria. Facility-type-specific integrated safeguards approaches have already been developed for:

- light water reactors, both with and without fresh mixed oxide fuel;
- research reactors;
- on-load refuelled reactors;
- spent fuel storage facilities.

Work is also under way on a number of other important issues, for example:

- the use of unannounced inspections in integrated safeguards;
- the role of State and regional systems of accounting and control;
- procedures for the randomised selection of facilities for inspection under integrated safeguards.

Safeguards Measures To Be Applied to Declared Nuclear Material Under Integrated Safeguards

15. Under integrated safeguards, the verification of declared nuclear material will remain of fundamental importance in ascertaining that there has been no diversion of such nuclear material. In accordance with the principle of non-discrimination, the safeguards approach for all facilities of a given type will be the same in any State where integrated safeguards is being

applied. However, the specific measures used in such an approach may differ according to individual facility characteristics and any State-specific considerations.

16. There are a number of issues relevant, in this context, to the development of integrated safeguards approaches which are general or common to several facility types. First is the timeliness goal for irradiated fuel. The current value of three months is based on the assumption that all necessary undeclared reprocessing, conversion and manufacturing facilities needed for recovering plutonium from irradiated fuel exist in a State, that these processes have been tested, and that the non-nuclear components of a nuclear explosive device have been manufactured, assembled and tested. The Agency's ability to detect undeclared nuclear material or activities in a State permits a reassessment of this value. Accordingly an increase in the timeliness verification goal for irradiated fuel to one year is being proposed. The cost savings from such a change are an important consideration. Such a change is also consistent with the requirement for annual verification of nuclear material inventories, which remains a principle under integrated safeguards. With the same considerations in mind, the timeliness goal for fresh mixed oxide (MOX) fuel assemblies has also been reassessed. A change from the current value of one month to a goal of three months is being proposed. As with irradiated fuel, the change recognizes that further processing would be needed to produce directly usable weapons material from fresh MOX fuel assemblies and that the Agency has an increased capability, under integrated safeguards, to detect any such processing.

17. The use of unannounced inspections, i.e. inspections for which no advance notification regarding inspection timing, activities or location is given to a State, is foreseen as an important component of integrated safeguards approaches for facilities. Unannounced inspections, because of their unpredictability to a State and a facility operator, not only enhance the Agency's ability to detect diversion of nuclear material and/or the misuse of a facility but also help to deter any such actions. In locations where unannounced inspections can be carried out effectively, the increased use of such inspections should also permit cost savings for the Agency.

18. Another issue in the consideration of new approaches is the Agency's experience with the use of surveillance as a safeguards measure. Surveillance has played an important role in many safeguards applications over the years and will continue to do so in future. The procurement and replacement of surveillance equipment has represented a significant part of the cost of safeguards implementation. However, in some cases, it has not been sufficiently reliable, with resulting additional costs and effort for the operator, the State and the Agency. The review of surveillance data can also be labour intensive and the results of reviews are not always conclusive, leading to the need for further verification activities. The consideration of possible alternatives to surveillance, where appropriate, has therefore been an element in the design of integrated safeguards approaches.

19. As noted in paragraph 14 above, integrated safeguards approaches for several facility types have now been developed. Features incorporated into these approaches include an annual physical inventory verification (PIV), the use of unannounced inspections where they can be carried out effectively and randomized selection of facilities for inspection. In addition, options are proposed where unannounced inspections cannot be conducted effectively. As described in GOV/INF/2000/26, the one-year timeliness goal for irradiated fuel results in the elimination of announced quarterly inspections and of the need for permanently installed surveillance recording continuously at a light water reactor (LWR) without MOX. For a LWR

with fresh MOX, the three-month timeliness goal for fresh MOX assemblies results in the elimination of announced monthly inspections. For efficiency in meeting this timeliness goal, it is proposed that fresh MOX fuel assemblies be under containment and surveillance (C/S) from receipt at the reactor until loading into the core. The timeliness goal for fresh MOX fuel can then be achieved by announced quarterly interim inspections or by quarterly evaluation of remotely transmitted C/S data. To maintain continuity of knowledge of the core fuel at LWRs both with and without MOX fuel, installation of temporary surveillance during refuelling and of a core seal between refuellings is proposed. The proposed approach for research reactors incorporates various options to accommodate the variety of research reactors under safeguards including random selection of reactors with small amounts of nuclear material for a PIV and additional unannounced inspections at high power reactors (e.g. greater than 25 MWth). The proposed integrated safeguards approach for on-load refuelled reactors includes the continued use of unattended flow monitors for core fuel discharges and C/S measures over the spent fuel ponds, both for cost effectiveness. In addition, broader involvement of the SSAC in verification of spent fuel transfers to dry storage and the use of unannounced inspections for maintaining the Agency's ability to draw independent safeguards conclusions are foreseen. These approaches are at varying stages of review and evaluation by the Secretariat, with input from the Group of Experts and from SAGSI.

The State-Level Integrated Safeguards Approach

20. A State-level integrated safeguards approach will be formulated for a State by combining the integrated safeguards approaches for the specific facility types present in the State and the implementation of additional protocol measures, taking into account the State's nuclear fuel cycle, the relationship between facilities and other State-specific features (for example, the Agency's ability successfully to carry out unannounced inspections in the State and the technical effectiveness of the SSAC). The combination will be carried out in an optimal way in order to achieve maximum effectiveness and efficiency within available resources. Information evaluation will play a key role in establishing and planning the activities under the State-level approach. One such approach has been developed and implemented in a State; others are being developed.

Near Term Work Plan

21. The Secretariat's near term work plan is to complete the review and evaluation of the facility-type-specific integrated safeguards approaches being developed and to continue to develop such approaches for other facility types, for example, natural and low enriched uranium conversion and fuel fabrication plants. The work is being prioritized on the basis of the types of nuclear facility present in States where additional protocols are already in force; where they are expected to enter into force in the near future; and on the amount of inspection effort expended with regard to those specific types of facility. Work will also continue on specific State-level approaches as described in paragraph 20. Work on guidelines/criteria for the implementation and evaluation of State-level approaches, including facility-type-specific criteria, will proceed in parallel.

22. It is expected that the conceptual framework for the implementation of integrated safeguards in all kinds of nuclear fuel cycles will be largely completed by the end of 2001. Work will proceed on the actual implementation of integrated safeguards in specific States when the necessary conclusions have been drawn regarding the non-diversion of declared

nuclear material and the absence of undeclared nuclear material and activities. As experience is gained through implementation of integrated safeguards, adjustments would be made accordingly.

C. ACTION PLAN FOR THE PROMOTION OF SAFEGUARDS AGREEMENTS AND ADDITIONAL PROTOCOLS

Conclusion of Safeguards Agreements and Additional Protocols

23. Since last year's General Conference, one comprehensive safeguards agreement with a non-nuclear-weapon State (NNWS) has entered into force[3]; four further NNWSs have signed comprehensive safeguards agreements[4] and the Board of Governors has approved a comprehensive safeguards agreement with one other NNWS.[5] The Board has also approved additional protocols for three States[6], all of which have been signed. Additionally, the Secretariat has received official notification from a total of seven more States that their additional protocols have entered into force.[7] Thus, to date, the Board has approved additional protocols for 57 States, 56 of which have been signed, 21 of which have entered into force, and one of which[8] is being provisionally applied.[9] These increases, although welcome, fall considerably behind expectations.

24. Taking as a major reference point the elements of a plan of action foreseen in Resolution GC(44)/RES/19, the Secretariat has been making efforts, within available resources, to implement the General Conference recommendations. A first step, foreshadowed in document GC(44)/12, was to complete its review of the plan of action which it had been following thus far. In reviewing and updating its plan of action to accord with the General Conference recommendations, the Secretariat identified three types of activity which might be taken or continue to be taken on an intensified basis:

- activities which the Secretariat itself could or could continue to take;
- possible activities for States, either alone or on some co-operative basis;
- possible activities which the Secretariat and States might undertake together.

It was also clear, from the review, that the focus of such initiatives would need to differentiate, on the one hand, between States with safeguarded nuclear material or facilities and, on the other hand, States with little or no nuclear activities. The respective needs of the two groups are inherently different.

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3 Laos.

4 The Former Yugoslav Republic of Macedonia, Andorra, Oman and Yemen.

5 Niger.

6 Andorra, Bangladesh and Latvia.

7 Azerbaijan, Bangladesh, Bulgaria, Canada, Peru, Slovenia and Turkey.

8 Ghana.

9 The measures foreseen in the Model Additional Protocol were also being implemented for Taiwan, China.

Secretariat Activities

25. In the case of States with safeguarded nuclear material and activities, efforts have focused on responding, or continuing (as appropriate) to respond to matters related to the technical, legal and/or administrative aspects which might be impeding the conclusion and/or entry into force of additional protocols and the underlying comprehensive safeguards agreements. This is because States with safeguarded nuclear material and facilities have in general made clear that any residual concern that their authorities might have about the additional protocol matters reflect concern about practical aspects of implementation. Details of the types of activities being carried out in this area and in the wider context of the plan of action were given in information distributed at a briefing for Permanent Missions on 31 January 2001. That information makes clear that, in the case of States with little or no nuclear material or activities, there are separate considerations to bear in mind. The enhanced plan of action reflects this.

26. For both groups of States, the Secretariat has taken every opportunity to maximize the potential of overseas visits by staff of other Agency programmes to bring outstanding correspondence about the additional protocol and about safeguards agreements to the attention of the relevant authorities. In this regard, it has established a specific "contact point" in each Department within the Secretariat. Since January 2001, the Secretariat has also embarked on several rounds of further correspondence with specific regional groups of States, and with individual countries, to reiterate the importance of additional protocols to a robust non-proliferation regime. Where appropriate, it has stressed the need first to conclude the necessary, comprehensive safeguards agreement. The IAEA office in New York has continued to be a useful conduit in contacts with the Permanent Missions of States which are not represented in Vienna.

Joint Activities

27. A major element of joint Agency/States activities has been co-operation on specific regional seminars and workshops. A regional seminar was held in Minsk, Belarus, in November 2000. The Minsk Seminar was co-sponsored by the Agency and the Government of Belarus and focused on discussing the technical, legal and policy aspects of concluding and implementing an additional protocol. The Agency made presentations on the content, structure and status of the additional protocol, and a round-table discussion with States stimulated further, useful exchanges of views. Two similar events have been held in 2001 and a further three are planned between now and December. Additional events are envisaged for 2002–2003.

28. In March 2001, the Secretariat co-operated with the Government of New Zealand in a seminar, sponsored by the UN Regional Centre for Peace and Disarmament in Asia and the Pacific, held in Wellington, New Zealand. The objective of the seminar was to discuss a wide range of security and non-proliferation issues as relevant to the South Pacific region. The Secretariat made presentations on Agency safeguards and the additional protocol and on compliance with States' obligations under the NPT. At the end of the seminar, there was also a specific event, covering these issues, for the Pacific Islands States.

29. In June 2001, an international symposium held in Tokyo was hosted by the Government of Japan in co-operation with the Agency. The basic objective was to discuss and facilitate the

conclusion of additional protocols by States in the Asia–Pacific region. In accordance with the plan of action foreseen in resolution GC(44)/RES/19, and the Secretariat's enhanced action plan, a main focus on the symposium was the practical aspects of concluding and subsequently implementing an additional protocol. In this respect, the seminar was a useful follow-up to the safeguards seminar jointly sponsored by the Agency and the Republic of Korea in October 1999 to which document GC(44)/12 referred.

30. Upon request of States, the Secretariat provided detailed information on the technical requirements of concluding and implementing additional protocols, as appropriate, while much of the practical assistance given to States has centred on legislative assistance. The first workshop on national legislation that needs to be developed in order to fulfil the State's obligations under the additional protocol is planned for the Baltic States and will take place in Estonia in November 2001. A regional seminar scheduled to take place in Kazakhstan later this year will be a useful occasion to further clarify technical, legal and policy matters related to additional protocols and safeguards agreements.

31. Arrangements are also well under way for a regional seminar to be hosted by the Government of Peru in Lima in December 2001. This will aim to deepen the understanding of Parties to the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) about the Model Additional Protocol and its contribution to global non-proliferation endeavours.

32. The Secretariat is aware of the fact that a number of Member States have advocated the conclusion of additional protocols (and, where applicable, the underlying comprehensive safeguards agreement) in their bilateral relations with other countries. The Secretariat appreciates these efforts and has attempted to facilitate them, when requested.

33. It is to be hoped that the activities described will facilitate universal adherence to the additional protocol. The Director General has made clear, on a number of occasions, that the full potential of the strengthened safeguards system can be realized only through universal adherence to all strengthening measures, in particular those in the Model Additional Protocol.