



International Atomic Energy Agency

GENERAL CONFERENCEGENERAL Distr.
Original: ENGLISH

Forty-fourth regular session of the General Conference
Item 16 of the provisional agenda
(GC(44)/1)

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

INTRODUCTION

1. In resolution GC(43)/RES/17(1999) on “Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System and Application of the Model Protocol”, the General Conference, *inter alia*, requested the Secretariat:

- (a) “to pursue the implementation of safeguards strengthening measures contained in document GOV/2807 and endorsed by the Board of Governors in 1995 as well as of Additional Protocols without delay as far as available resources permit;” and:
- (b) “to intensify, within available resources, its efforts to conceptualize and develop an integrated and cost-effective safeguards system.”

It also requested the Secretariat:

- (c) “to continue to explore all possibilities of achieving reductions in safeguards inspection costs.”

The resolution affirmed:

- (d) “that strengthening the effectiveness and improving the efficiency of the safeguards system with a view to detecting undeclared nuclear activities must be implemented rapidly and universally by all concerned States and other Parties in compliance with their respective international commitments;”

and reiterated:

- (e) “its support for the Board’s decision to request the Director General to use the Model Additional Protocol as the standard for additional protocols which are to be concluded by States and other Parties to comprehensive safeguards agreements with the Agency and which should contain all of the measures in the Model Additional Protocol;”

The General Conference additionally reiterated its support for the Board's decision to request the Director General:

- (f) “to negotiate additional protocols or other legally binding agreements with nuclear-weapon States incorporating those measures provided for in the Model Additional Protocol that each nuclear-weapon State has identified as capable of contributing to the non-proliferation and efficiency aims of the Protocol when implemented with regard to that State, and as consistent with that State's obligations under Article 1 of the NPT;” and also:
- (g) “to negotiate additional protocols with other States that are prepared to accept measures provided for in the Model Additional Protocol in pursuance of safeguards effectiveness and efficiency objectives”.

It also repeated the request made in General Conference resolution GC(42)/RES/17(1998) to:

- (h) “all concerned States and other Parties to safeguards agreements which have not yet done so to sign additional protocols promptly;”

and requested:

- (i) “States and other Parties to safeguards agreements having signed additional protocols to take the necessary measures to bring them into force or provisionally apply them as soon as their national legislation allows.”

Finally, the General Conference requested the Director General:

- (j) “to report on the implementation of this resolution to the General Conference at its forty-fourth regular session.”

This report is pursuant to that request.

2. Since the 43rd Regular Session of the General Conference, further progress has been made towards implementing a more effective and efficient safeguards system, hereinafter referred to as the “Strengthened Safeguards System”. The work falls into three broad categories:

- (a) **implementation of safeguards strengthening measures within the Agency's legal authority under INFCIRC/153(Corrected) safeguards agreements** (referred to in GOV/2807, as mentioned in resolution GC(43)/RES/17/(1999));
- (b) **work related to the implementation of measures contained in the Model Protocol Additional to Safeguards Agreements** (“Model Additional Protocol”) approved by the Board of Governors of the Agency in May 1997 (INFCIRC/540(Corrected)); and
- (c) **the development of “integrated safeguards”**. The term “integrated safeguards” denotes the optimum combination of all safeguards measures available to the Agency under comprehensive safeguards agreements and Additional Protocols which achieves the maximum effectiveness and

efficiency within available resources in fulfilling the Agency's right and obligation in paragraph 2 of INFCIRC/153 (Corrected).

3. Within the first two categories, work continues to be based on the three main technical elements of the Strengthened Safeguards System: increased access to information about States' nuclear materials and activities, increased physical access for Agency inspectors to sites and locations and the use of new technology. The third category, the development of an integrated and cost-effective safeguards system, remains the prime focus of current and future work. Significant progress has been made in this area since the last General Conference.

A. IMPLEMENTATION OF SAFEGUARDS STRENGTHENING MEASURES WITHIN THE AGENCY'S LEGAL AUTHORITY UNDER INFCIRC/153 (CORRECTED) SAFEGUARDS AGREEMENTS

Information evaluation

4. The Director General explained in his report (GC(43)/22) to last year's General Conference that a significantly strengthened, broad-based process had been established to evaluate the substantially increased amount of information about States' nuclear programmes available to the Agency as a result of safeguards strengthening measures of recent years. Since then the process has been further strengthened by the formation of multi-disciplinary 'State Evaluation Groups', the establishment of procedures for integrating the results of facility-level and State-level evaluations, and measures to improve quality control and assurance.

5. Since the 1999 General Conference, the Secretariat has continued to implement its programme to conduct evaluations of all the information available on the nuclear activities of States with comprehensive safeguards agreements. This includes: information submitted by States; information generated by the Secretariat's verification activities; and other available information — including open-source information and commercial satellite imagery. As of the end of July 2000, the Secretariat had prepared and reviewed evaluation reports on the nuclear programmes of a total of 38 States.

6. The Secretariat intends to update and review, on a regular basis, or as warranted by changing circumstances, the existing evaluation reports. These updates will reflect the results of follow-up activities arising from the previous report and the evaluation of any new information obtained, and will ensure continuing confidence in the conclusions which have been reached. To date, nine of the 38 State evaluation reports have been so updated.

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

7. Safeguards strengthening measures place an even greater emphasis on working closely with State and regional authorities so as to increase verification effectiveness and cost efficiency, while preserving the Agency's capability to draw independent safeguards conclusions. Recently, progress has been made in several areas involving joint and shared activities: for example, with EURATOM, in equipment research and development; with ABACC, for the development of procedures for the common procurement and use of safeguards equipment, and for common training courses; and with the SSACs of Japan and

the Republic of Korea, in the development of procedures for the joint use of safeguards equipment.

Environmental Sampling

8. Since last year's General Conference, the Secretariat has continued the collection and analysis of environmental samples from facilities, in particular from enrichment plants and installations with hot cells (a total of 158 samples since October 1999). Environmental sampling is now well established and in routine use as a principal strengthening measure.

Remote Monitoring

9. The transmission to Headquarters of data from safeguards equipment, e.g. from cameras and seals, without the presence of an inspector, is known as remote monitoring. Last year's report of the Director General to the General Conference noted that, although field trials of remote monitoring had been successfully completed, this measure had not been implemented routinely owing, *inter alia*, to the need for further discussions with relevant Member States and budgetary constraints. Since the last General Conference, remote monitoring has been subject to further extensive re-appraisal and cost-benefit analysis. The results show that the cost-effectiveness of using remote monitoring is highly case specific. The decision to install the necessary equipment will therefore be taken after a cost-benefit analysis shows that it is justified to do so. The role of remote monitoring in integrated safeguards is also being studied and will be included in the analysis as appropriate. Extensive R&D work on reducing the cost of data transmission is being conducted with the assistance of Member State Support Programmes.

Inspector Training

10. An enhanced training curriculum has been developed to provide inspectors with the broader skills required under the Strengthened Safeguards System. The "Nuclear Fuel Cycle and Proliferation Indicators" course has been expanded to include training exercises at nuclear fuel cycle facilities in the United Kingdom. Other courses have been added, such as "Complementary Access: Roles and Responsibilities". These will complement the current curriculum that includes courses on environmental sampling, enhanced observational skills, State evaluations and seminars on strengthened safeguards.

B. WORK RELATED TO THE IMPLEMENTATION OF MEASURES CONTAINED IN THE MODEL PROTOCOL ADDITIONAL TO SAFEGUARDS AGREEMENTS

Conclusion of Additional Protocols

11. In report GC(43)/22 to last year's General Conference, the Director General described what the Secretariat had been doing to encourage States to conclude Additional Protocols in accordance with the Foreword to, and based on the model text in, INFCIRC/540 (Corrected). The Director General noted, *inter alia*, that as of the date (26 August 1999) of his report to the 1999 General Conference, an overall total of 41 Additional Protocols had been approved by the Board. Five Additional Protocols had entered into force and one was being applied provisionally.

12. Since then, the Board of Governors has approved a further 13 Additional Protocols: one with a nuclear weapon State¹, one with a State² which has concluded “item specific” safeguards agreements with the Agency based on INFCIRC/66 Rev. 2, and 11 with non-nuclear-weapon States³. All but two of the Additional Protocols now approved by the Board for a total of 54 States have been signed. Nine further Additional Protocols have entered into force,⁴ giving a total of 14 Additional Protocols in force, and another one continues to be applied provisionally⁵. In addition, the measures foreseen in the Model Additional Protocol are being implemented in Taiwan, China.

13. These developments, although welcome, have not matched expectations. As the General Conference will recall, universal adherence to the Additional Protocol by the year 2000 has been a high priority for the Secretariat. To that end, the Secretariat has continued to take all appropriate opportunities to reiterate the significance of the Additional Protocol and to encourage States to conclude one. In addition to bilateral contacts, informal discussions and formal consultations, the Secretariat has continued its efforts to promote the Additional Protocol in regional settings. For example, with the co-operation of the Government of the Republic of Korea (ROK), the Agency and the ROK jointly sponsored a Safeguards Seminar which took place in Taejon City, ROK, from 18 to 22 October 1999 and which had the Additional Protocol as a focus. Additionally, the Secretariat welcomed the opportunity provided by last year’s Regular Session of the General Conference of the Organization for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL), in Lima, Peru, from 30 November to 1 December 1999 and by an International Seminar, which took place immediately thereafter, to further promote the Additional Protocol. During the course of 2000, further regional meetings are scheduled to take place in Thailand and possibly in Belarus.

14. The Secretariat has also used major non-proliferation related events such as the 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), to encourage universal subscription to the Additional Protocol and to follow-up contacts with States. The background paper (NPT/CONF.2000/9) which the IAEA Secretariat was asked to prepare for the Conference on its activities relevant to Article III of the NPT noted that fewer than one-third of the States Party to the NPT had responded to calls of the Board of Governors to strengthen safeguards by concluding Additional Protocols. In his address to the Review Conference, the Director General urged the 51 States which had yet to bring their NPT-related safeguards agreements into force to do so promptly, this being a legal requirement under the Treaty and a crucial first step towards an Additional Protocol. He also encouraged those States which had not yet done so — in particular States with nuclear facilities under safeguards - to conclude Additional Protocols and those which had done so to bring them into force, as soon as possible. The Director General also made clear that it is only in respect of States which have both a comprehensive safeguards agreement and an

¹ Russian Federation.

² Cuba.

³ Azerbaijan, the Czech Republic, Ecuador, Estonia, Indonesia, Namibia, Nigeria, Peru, Switzerland, Turkey, Ukraine.

⁴ Croatia, Hungary, Indonesia, Japan, Lithuania, Monaco, Norway, Poland, Romania.

⁵ Ghana.

Additional Protocol in force that the Agency can fully implement the safeguards required by Article III of the NPT, thereby providing assurance, not only of the non-diversion of declared nuclear material, but also of the absence of any undeclared nuclear material and activities.

15. In its Final Declaration, the 2000 NPT Review Conference noted that 51 States parties to the Treaty had yet to bring into force comprehensive safeguards agreements, and urged them to do so as soon as possible. It also encouraged all States parties, in particular those with substantial nuclear programmes, to conclude Additional Protocols and to bring them into force or provisionally apply them as soon as possible. The Conference also recommended that the Director General and Member States consider ways and means, which could include a possible plan of action, to promote and facilitate the conclusion and entry into force of safeguards agreements and Additional Protocols, including, for example, specific measures to assist States with less experience in nuclear activities to implement legal requirements. With these considerations in mind, the Secretariat has been reviewing the plan of action which it has followed thus far, with a view to enhancing it. It has already had some preliminary interaction with Member States to explore their ideas.

Preparations for, and Implementation of, the Additional Protocol

16. The Secretariat has continued to prepare for, and has gained further experience in, the implementation of Additional Protocol measures. As noted in last year's report, guidelines have been developed to help States to prepare and submit their declarations pursuant to Articles 2 and 3 of their Additional Protocols. Internal guidelines for complementary access have been further developed for all types of location specified in Additional Protocols and are now being finalized; a summary document for States is being prepared. Also, a software system to enable States to prepare and submit their Article 2 declaration in computerized form has been developed and tested. This system, known as the Protocol Reporter, is available to all States upon request. With regard to gaining further experience in the implementation of Additional Protocol measures, implementation trials and implementation of Additional Protocols that have entered into force have been key areas.

Implementation Trials

17. An extensive trial at two large nuclear sites, involving senior Agency staff members, was completed at the end of 1999 in Japan. It provided practical experience in carrying out complementary access on complex nuclear sites, particularly with regard to logistics and managed access.

18. Two additional trials are planned in Finland and the Netherlands. The objectives are to test all elements of the Additional Protocol in the Netherlands, where the relevant State responsibilities will be transferred to EURATOM, and in Finland, which will retain the responsibilities that are not relevant to the Euratom Treaty.

19. The United Kingdom has provided voluntary Article 2 declarations on a trial basis, before entry into force of its Additional Protocol. This submission has been helpful in testing systems and procedures dealing with the receipt, processing and evaluation of such information.

Implementation of Additional Protocols

20. The evaluation reports on States' nuclear programmes, referred to in paragraph 5 above, provide a benchmark against which information submitted by States pursuant to Article 2 of an Additional Protocol can be evaluated. In this process, the Secretariat identifies any areas where further amplification or clarification is needed, questions or inconsistencies which need to be resolved, and appropriate follow-up actions. The outcome and follow-up of these evaluations are central to reaching conclusions regarding the absence of undeclared nuclear material and activities in a State with a comprehensive safeguards agreement and an Additional Protocol in force. As of the end of July 2000, eight States⁶ had submitted information under Article 2 of their respective Additional Protocols and, as a result, are covered by the second phase of the evaluation process. As of this date the Secretariat had compiled and reviewed six evaluation reports which take into account the information submitted under Article 2 and complementary access had been conducted in four States (and Taiwan, China).

21. Significant staff resources have been used in reviewing the Article 2 declarations and in preparing for complementary access. Specific objectives were identified for each instance of complementary access, including, in many cases, the collection of environmental samples. The accesses were carried out and documented and the ensuing reports prepared and submitted to the relevant States.

C. THE DEVELOPMENT OF "INTEGRATED SAFEGUARDS"

22. As noted in the Director General's report to the 1999 General Conference, the most important area of current and future work on the Strengthened Safeguards System continues to be that of integrating traditional nuclear material verification activities with new strengthening measures. Significant progress has been made since last year. A detailed status report on the Secretariat's work on integrated safeguards was presented to the Board of Governors in March 2000 (GOV/INF/2000/4).

Objectives and Basic Principles of Integrated Safeguards

23. The measures provided for in a comprehensive safeguards agreement together with an Additional Protocol, when implemented in a State, aim to enable the Agency to draw the necessary safeguards conclusions and thereby provide credible assurance of **both** the non-diversion of nuclear material from declared activities **and** of the absence of undeclared nuclear material and activities in the State as a whole. The Agency's ability to provide this assurance creates the potential for eventual reductions in inspection effort. A positive conclusion by the Agency on the absence of undeclared nuclear material and activities in a State as a whole, particularly activities related to enrichment and reprocessing, would permit a redefinition of current safeguards implementation parameters (e.g. timeliness, detection probabilities) for less sensitive nuclear material (e.g. depleted, natural and low enriched uranium and irradiated fuel), with corresponding reductions in the current level of safeguards verification effort on such declared nuclear material. For example, the diversion of declared irradiated fuel and the existence of an undeclared reprocessing plant are both part of the same

⁶ Taiwan, China has also submitted the information elicited in Article 2 of the Model Additional Protocol.

potential path for the acquisition of nuclear material readily usable for a nuclear explosive device. Measures to detect either activity contribute to the Agency's overall ability to detect this particular acquisition path. Therefore, the effective implementation of measures to detect undeclared reprocessing in a State should permit reductions to be made in the effort expended to detect the diversion of spent fuel. The result of this process of integration of measures under comprehensive safeguards agreements with those in Additional Protocols is referred to as "integrated safeguards".

24. The basic principles which govern the development of integrated safeguards are that: (a) they be non-discriminatory, i.e. although the measures actually used in individual States may differ, the same technical objectives must be pursued in all States with comparable safeguards obligations; (b) they be based on State-wide considerations, i.e. (i) comprehensive evaluation of information for the State as a whole should play a key role in planning the activities implemented in that State, and (ii) integrated safeguards approaches should be designed to provide coverage of all plausible acquisition paths by which a State might seek to acquire nuclear material for a nuclear explosive device; and (c) nuclear material accountancy remains a safeguards measure of fundamental importance.

25. The main focus of the work on integrated safeguards is currently the detailed development of guidelines, safeguards approaches and implementation criteria. This work includes:

- a) specifying in detail the process by which a positive conclusion on the absence of undeclared nuclear material and activities in a State can be drawn and maintained; and
- b) having drawn this conclusion, considering what measures would subsequently be appropriate to apply to declared nuclear material in specific types of facility in order to continue to provide a conclusion of its non-diversion.

26. As noted in the Director General's last report to the General Conference, the development programme is being undertaken within the Secretariat together with the assistance of a group of experts, with advice from the Standing Advisory Group on Safeguards Implementation (SAGSI) and with the help of a number of Member State Support Programmes.

Conditions for the Implementation of Integrated Safeguards

27. It is important to note that the entry into force of an Additional Protocol is not in itself a sufficient basis for the Agency to modify safeguards measures currently implemented in a particular State with a comprehensive safeguards agreement. To reduce certain traditional verification measures on declared nuclear material, positive conclusions on the non-diversion of such material and on the absence of undeclared nuclear material and activities in the State as a whole are required. The conditions for such conclusions, after entry into force of an Additional Protocol, include the following: (a) the State has complied in a timely manner with the requirements of its safeguards agreement and Additional Protocol; (b) the Agency has implemented the necessary measures for verifying declared nuclear material and has drawn a conclusion of non-diversion of such material; and (c) the Agency has: (i) conducted a broad-based State evaluation based on all information available, including the declarations submitted by the State under Article 2 of the Additional Protocol, and satisfactorily resolved

any inconsistencies and questions, and (ii) implemented complementary access, as necessary, in accordance with the Additional Protocol.

28. Once positive conclusions on the non-diversion of declared nuclear material and on the absence of undeclared nuclear material and activities can be drawn for a State as a whole, the implementation of integrated safeguards can proceed. However, the ability of the Agency to continue to draw such conclusions must be maintained under integrated safeguards by continuing to implement measures to verify the non-diversion of declared nuclear material (see paragraphs 29 to 31 below), by continuously reviewing and evaluating information, by continuing to take all actions necessary to resolve questions and inconsistencies and by conducting complementary access as necessary. If, following the implementation of integrated safeguards, the Agency were not able to reaffirm the conclusion on non-diversion of declared nuclear material or on the absence of undeclared nuclear material and activities for a State as a whole, corrective actions would have to be taken which, depending on the circumstances, could include restoring traditional safeguards activities in the State, while continuing to implement the measures of the Additional Protocol.

Safeguards Measures Applied To Declared Nuclear Material Under Integrated Safeguards

29. Under integrated safeguards, the verification of declared nuclear material will remain of fundamental importance. In accordance with the principle of non-discrimination referred to in paragraph 24 above, the generic safeguards approach for facilities of a given type will be the same in any State where integrated safeguards is being applied. However, the measures used in a specific approach may differ according to individual facility characteristics and any State-specific considerations.

30. In this context, the first facility type to be considered in the development of generic safeguards approaches was light water reactors without mixed oxide (MOX) fuel, since these facilities currently absorb approximately 20% of inspection effort. Considerable work has been done on developing this first approach in sufficient detail and specificity to permit its review and evaluation. The basic features of the proposed approach are: an annual physical inventory verification, during which temporary surveillance is maintained over the open reactor core; sealing of the core between refuellings; and a small number of unannounced inspections. Under this approach, the timeliness verification goal for irradiated fuel would be changed to 12 months from the current value of 3 months. The present requirements for permanent surveillance and routine quarterly inspections would be eliminated under the proposed approach, which is currently being evaluated with the assistance of SAGSI.

31. Achieving overall cost neutrality when integrated safeguards is implemented on a sufficiently broad scale remains a goal. Cost neutrality in this context has as a reference point the actual level of expenditure on safeguards activities in 1997⁷ (around \$95 million, compared to a regular budget figure for safeguards of \$82 million) i.e. before any Additional Protocols were implemented. There will, however, be an increase in costs related to the implementation of safeguards in any State during the period after an Additional Protocol enters into force and pending a conclusion of the absence of undeclared nuclear material and

⁷ This reference level does not include additional costs related to major new projects such as the large reprocessing plant at Rokkashomura in Japan.

activities. During this period, both traditional safeguards and Additional Protocol measures will be implemented. Thereafter, the reduction in inspection effort for less sensitive nuclear material should in the long run at least partially offset increases related to information review and evaluation at Headquarters, to the follow-up of questions and inconsistencies, to the implementation of complementary access on a selective basis, to the purchase of new equipment and the covering of increased communication costs following the progressive use of remote monitoring where relevant. The introduction of other efficiencies, e.g. those resulting from internal management restructuring, will also help to offset such increases.

Near-term Work Plan

32. The Secretariat's plan for the near term is to continue to develop integrated safeguards approaches for other facility types, namely research reactors, spent fuel storage facilities, on-load reactors and low enriched uranium fuel fabrication plants. The work is being prioritized in this order on the basis of the types of nuclear facility present in States where Additional Protocols are already in force or are expected to enter into force within the year and on the amount of inspection effort associated with those types of facility. Work on related safeguards criteria will proceed in parallel. These criteria will be designed to replace the current ones where integrated safeguards are implemented. Work will also be conducted on specific State-level approaches involving the combination of integrated safeguards approaches for the different facility types, taking into account the interaction between facilities, the implementation of the measures of the Model Additional Protocol and other State-specific features, so as to maximize effectiveness and efficiency.

33. It is expected that the conceptual framework for integrated safeguards in all types of nuclear fuel cycle will be largely completed by the end of 2001. Work will proceed on the implementation of integrated safeguards in specific States when the necessary conclusions have been drawn and the relevant facility-type approaches have been developed. As more Additional Protocols enter into force, and subsequently more States meet the conditions for the implementation of integrated safeguards, the focus of the work after 2001 will move towards implementation support. As experience is gained with the implementation of integrated safeguards, adjustments to the system can be made in an evolutionary manner.