Foreword

The Additional Protocol and the Road to Integrated Safeguards

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Effective International Atomic Energy Agency safeguards remain the cornerstone of the nuclear nonproliferation regime, based upon the Treaty on the Nonproliferation of Nuclear Weapons (NPT), which is aimed at preventing the spread of nuclear weapons and moving toward nuclear disarmament. There have been many challenges to the nonproliferation regime over the years, however its continued success has been, to a great extent, dependent on the ability of the IAEA's safeguards system to adapt in response to those challenges.

Events in the early 1990s—including the discovery that Iraq pursued a completely clandestine nuclear weapons program despite the IAEA's successful verification of declared nuclear material—underscored the importance of strengthening the IAEA's capability to detect undeclared nuclear material and activities. With the support of the international community, a concerted effort was made in the 1990s to identify and implement measures to strengthen the safeguards system. This effort focused on two aspects: measures that could be introduced under the legal authority of comprehensive safeguards agreements (CSAs), and additional rights that were incorporated into a Model Protocol Additional to safeguards agreements (INFCIRC/540 [Corr.]), approved by the IAEA Board of Governors in 1997.

Nuclear material accountancy remains of fundamental importance in the implementation of strengthened safeguards, and the IAEA, by implementing a focused action plan to address safeguards implementation difficulties, has continued to improve its attainment of inspections goals for declared nuclear material and now maintains that attainment at a high level.

The strengthening measures under the legal authority of CSAs include increased access to and evaluation of information, including early provision of nuclear facility design information and voluntary reporting of exports of specified non-nuclear material and equipment by states; the use of advanced technology such as environmental sampling and unattended monitoring systems; and the review and strengthening of safeguards approaches, where needed.

Under an Additional Protocol (AP), a state with a CSA is obliged to provide the IAEA with a wider range of information regarding all aspects of its nuclear fuel cycle, nuclear-related R&D program, and manufacture and export of sensitive nuclear-related technologies. In addition, the IAEA has the right to access a wider range of nuclear-related locations to assure the absence of undeclared nuclear material and activities, verify the status of decommissioned facilities and locations outside facilities, and resolve questions or inconsistencies with regard to the state's declarations.

With the introduction of the safeguards strengthening measures, including APs, the safeguards system has changed fundamentally since 1992. Whereas the focus was on declared nuclear material at the facility level, the strengthened safeguards system is now based on a *state-level* approach, under which the IAEA evaluates the results of its verification activities and all other available information about the state's nuclear and nuclear-related activities in order to draw safeguards conclusions and to plan safeguards activities. Safeguards activities seek not only to assure the accuracy of state reports on declared nuclear material, but also to ascertain whether a state with a CSA in force has declared to the IAEA all that it is required to declare. In order to implement information-driven safeguards based on state evaluations, the IAEA has developed a robust capability to collect, process, analyze, evaluate, and archive information, supported by the needed training and technological infrastructure.

To ensure the measures of the AP are not simply superimposed as a new layer of activity on top of the *traditional* safeguards measures that have been applied to declared nuclear material and facilities, the IAEA has developed and begun to introduce optimized, or *integrated* safeguards approaches for specific states. In states with CSAs and APs for which the IAEA Secretariat has found no indication of the diversion of nuclear material placed under safeguards and no indication of undeclared nuclear material or activities, the broader conclusion can be drawn that all nuclear material within the territories of those states, under their jurisdiction or under their control anywhere had been placed under safeguards and remained in peaceful nuclear activities or was otherwise adequately accounted for. Once such a broad conclusion is drawn, it is possible to modify the state-level safeguards approach based on the increased safeguards assurances thereby reducing, in some cases, in-field verification activities on declared nuclear materials.

The IAEA has developed a conceptual framework[1] for integrated safeguards and has begun to implement integrated safeguards in some states. Currently, state-level integrated safeguards

approaches are under development for several more states and are expected to be implemented in the near term, including in states with large nuclear programs, where more significant savings are expected to be realized.

Although many new measures have been implemented to strengthen the IAEA's capabilities and credibility, the IAEA continues to strive for further improvements both to the effectiveness of safeguards measures and their cost efficiency.

Over the last several years, the commercial knowledge and technologies necessary to conduct a covert nuclear weapons program have become more accessible, and the means to implement procurement, deception, and concealment strategies have become increasingly sophisticated. This is evidenced by the uncovering of clandestine nuclear programs in Iran and Libya, and the recently revealed information on the extensive covert networks of supply of sensitive nuclear technology. It is therefore necessary that the IAEA continue to develop and implement increasingly sophisticated means of detecting undeclared nuclear material and activities.

It is clear that universalization of the AP would greatly contribute to international nuclear nonproliferation assurances. Despite the safeguards strengthening measures introduced under the legal authority of CSAs, unless a state has an AP in force, the IAEA does not have a sufficient basis on which to draw conclusion on the absence of undeclared nuclear material and activities for the state as a whole. The number of states that have an AP in force is far below what was expected in 1997. As of May 1, 2004, APs were in force or otherwise applied in fifty-seven states.[2]

Even for states with CSAs and APs in force, there are limitations on the types of information and locations accessible to IAEA inspectors. Although there are mechanisms for obtaining the information needed to ascertain the completeness of state-supplied information, either from the state or from other sources, the process of completing the consistency analysis needed for drawing credible conclusions may require an extended period of time. Based on the IAEA's experience, there is no doubt that the close cooperation of the state in overcoming limitations that impact on the IAEA's ability to draw safeguards conclusions saves time and resources and bolsters confidence in the results. These measures include, but are not limited to, the timely provision of accurate reports, declarations, and other information required under their safeguards agreements; provision of one-year multiple entry/exit visas for designated inspectors; and granting unfettered access to facilities and locations for verification purposes. Further transparency commitments on the part of the state to provide information and access rights would further increase the efficiency, effectiveness and overall credibility of the NPT regime. Such information could include for instance exports of dual use equipment, export denials, and related information. Access rights would allow IAEA inspectors to go anywhere, and interview anyone, at any time.

Implementation of the safeguards strengthening measures, the most significant of which are APs, has dramatically altered the way that safeguards are implemented and has increased the nonproliferation assurances that can therefore be derived. Based on the increased assurances, state level safeguards approaches can be made more efficient through the introduction of integrated safeguards. It is important that a dynamic safeguards system, which identifies and addresses safeguards implementation issues as they arise, be maintained in order to respond to further nonproliferation challenges in the future. It is expected that the safeguards system and the IAEA's verification rights will have to be adapted as necessary.

The implementation of APs and the introduction of integrated safeguards have provided valuable new capabilities and experience in the IAEA's ability to respond to safeguards challenges. It is therefore fitting that, seven years after its approval by the IAEA Board of Governors, this issue of the *Journal of Nuclear Materials Management* takes stock of the experience and expectations in implementing APs and introducing integrated safeguards.

Notes

1. The framework comprises the safeguards concepts, approaches, guidelines, and criteria that govern the implementation of integrated safeguards, defined in paragraph 4 of GOV/INF/200/26 as "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)."
2. Including Ghana, which is implementing an AP on a provisional basis, and Iran and Libya, which have agreed to implement the measures foreseen in the Model Additional Protocol pending the entry into force of their APs. In addition, the measures foreseen in the Model Additional Protocol are being implemented in Taiwan, China.