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Opportunities for US/Russian Collaboration in Strengthening the IAEA's Safeguards System¹

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The International Atomic Energy Agency (IAEA) has been implementing safeguards for almost sixty years. Safeguards have developed from the early, item-specific safeguards of the 1960s to comprehensive safeguards in the '70s and '80s, to strengthened safeguards, which the IAEA has been implementing since the early 1990s in response to member states' demand for a more robust verification regime. Each of these developments has come about as a function of states' need for individual and collective security and shifting perceptions as to how to address the threat posed to that security by the proliferation of nuclear weapons.

IAEA safeguards are not based on confidence; they are designed to create confidence. The degree of confidence created is directly dependent on the scope and reliability of the verification process. But safeguards are only as effective as the member states want them to be.

A review of history demonstrates that the greatest achievements in IAEA safeguards have only come about with the support and assistance of the United States and the Soviet Union/Russian Federation. There is little doubt that both governments want IAEA safeguards to be efficient and effective, as well as transparent to member states. However, while both countries value these principles, their views on a number of specific safeguards issues have differed, some of which have surfaced during meetings of the IAEA's policy-making organs and other technical meetings.

Notwithstanding these differences, Russia and the United States continue to attach high value to the IAEA and its role in curtailing nuclear proliferation. They should put aside these disagreements and seize opportunities to work together to maintain the technical effectiveness of IAEA safeguards and to ensure that the IAEA is prepared to face current and future proliferation challenges.

Historical Background

The IAEA established the framework for comprehensive safeguards agreements (CSAs) in 1971 with the Board of Governors' approval of "The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons" (INFCIRC/153 (Corr)).

For the first twenty years of the implementation of CSAs, IAEA safeguards activities were, as a practical rather than a legal matter, focused primarily on verifying declared nuclear material at declared facilities. Safeguards were implemented and evaluated on a

¹ The paper was prepared for the US-Russia Dialogue on Nuclear Issues meeting on "U.S.-Russian Cooperation at Vienna- and Geneva-based International Organizations," held in Vienna, June 23-24, 2017

facility-by-facility basis, using prescriptive quantitative criteria, rather than by examination of the state and its nuclear-related activities as a whole. As a consequence of this approach, although the Agency routinely sought to verify that there was no undeclared production of nuclear material at declared facilities, in particular at research reactors, it did not seek to verify that there was no undeclared nuclear material elsewhere in the state. The flaw in that facility-level approach became evident with the discovery of Iraq's undeclared nuclear activities in 1991.

Between 1991 and 1993, the IAEA Board and General Conference took a number of decisions reaffirming the Agency's right and obligation to ensure that, in a state with a CSA, no nuclear material, whether declared or undeclared, is diverted to nuclear weapons or other nuclear explosive devices. In other words, the objective of IAEA inspections under such agreements is verification not just of the non-diversion of declared nuclear material (the correctness of state declarations), but also of the absence of undeclared nuclear material and activities (the completeness of state declarations).

At the end of 1993, the IAEA Secretariat, at the request of the Board, initiated Programme 93+2 with the objective of developing a comprehensive set of measures for strengthening safeguards. These measures, which were presented to the Board in 1995, comprised two parts.

The first part consisted of measures that could be implemented under the existing legal authority of CSAs, which the Board endorsed in June 1995.² The most significant of these measures was a profound change in the IAEA's evaluation of information available to it about a state. Instead of assessing the results of its verification activities separately for each individual facility in a state, the IAEA would visualize a state's nuclear program in a coherent and connected way by looking at the state as a whole.³

The second part consisted of measures that the Secretariat proposed to enhance the IAEA's ability to derive safeguards conclusions regarding the absence of undeclared nuclear materials and activities. These measures (broader access to information and locations and simplified administrative measures) were eventually transformed into the Model Additional Protocol, which the Board approved in May 1997.

As the Board was informed during the negotiation process, while the additional information to be provided under the Model Additional Protocol would be systematically analyzed for internal consistency and for consistency with other information, it was not the Secretariat's intention to proceed with a systematic or mechanistic verification of that information, i.e. judgements about the need for verification would tend to be qualitative rather than based on a "mechanical, automatic, bureaucratic, criteria-driven verification" (GC(39)/17, Annex 6, p.2, para. 45). The member states were also informed that, insofar as an important aspect of Model Additional Protocol was the implementation of activities

² In June 1995, the Board endorsed, in general, the Part 1 measures. The General Conference, in September of that year, "endorse[d] the decision by the Board of Governors to authorize the Secretariat to implement at an early date [those measures], after consultations between the Secretariat and individual Member States." GC(39)/RES/17 (1995).

³ GC(39)/17 (1995); GC(39)/17/Annex 1 (GOV/2784, February 1995); GC(39)/17/Annex 4 (GOV/2807, May 1995).

motivated by information coming to the Agency from third parties or Agency activities outside the state, this possibility could not be made subject to rote criteria.

As described in the Secretariat's reports on Programme 93+2, an important consequence of these strengthening measures was that they would not only improve safeguards effectiveness, but also permit the IAEA to introduce efficiencies in the implementation of safeguards. If, based on the results of the implementation of a CSA together with an AP, the IAEA is able to conclude that a state's declarations under its CSA were correct and complete (commonly referred to as "the broader conclusion"), the IAEA can consider reducing its in-field inspection effort on those parts of the nuclear fuel cycle that are less proliferation sensitive. For example, if the Agency is able to assure itself that there is no undeclared reprocessing in a state, it can reduce the frequency of inspections at a power reactor using low enriched uranium from four times a year to once a year.

In 2002, the conceptual framework for this process, known as integrated safeguards, was presented to the Board. The Board took note of it, and the Secretariat proceeded to implement it. Within this framework, the IAEA took into account state-specific characteristics and features and all other safeguards relevant information available to it about the state concerned and, in consultation with the state, developed a customized "state-level integrated safeguards approach."

The term "state-level concept" was first used with reference to this process in the Safeguards Implementation Report (SIR) for 2004, which was taken up by the Board of Governors in June 2005. As noted in the SIR, the state-level concept was already being implemented for states with integrated safeguards and eventually would be extended to all other states with CSAs. The report also stated that the next step would be the evolution of safeguards to take full advantage of the information available to the IAEA in order to better focus safeguards activities in all CSAs, given the environment of increasing verification demands and a static safeguards budget. So entered into the lexicon of safeguards "state-level concept," or "SLC": another way of referring to the IAEA's practice of evaluating all safeguards relevant information about a state as a whole and, where possible, tailoring safeguards to fit the state concerned.

At that same meeting of the Board in June 2005, the Board, acting on an initiative of the United States, also established an "Advisory Committee on Safeguards and Verification within the Framework of the IAEA Statute" with a two-year mandate (Committee 25). The Advisory Committee was to consider ways and means to strengthen the safeguards system and make relevant recommendations to the Board.

In his introductory statement to the Board at that meeting, the Director General underscored that "the strengthening of the Agency's safeguards system to deal effectively with evolving proliferation challenges should be an ongoing process." He was of the view that a new committee could usefully explore how the safeguards system might be further strengthened. In his view, the areas that could be addressed by the committee should include: "more information sharing, the use of new emerging technologies, enhancing the Agency's independent analytical capabilities, and ensuring that the Agency has an adequate and uniform legal authority to conduct credible verification."⁴

⁴ Statements of the Director General, 14 June 2005.

The Russian Federation supported the creation of the Committee, noting that “[t]he G8 action plan on non-proliferation [had] stated that, in order to enhance the authority and effectiveness of the Agency’s activities and bolster its ability to ensure states’ compliance with their NPT and safeguards obligations, G8 leaders would work together on the creation of a special committee of the Board of Governors whose functions would include the preparation of a comprehensive plan for strengthening safeguards and the verification regime.” The Russian delegation said that Russia would like the committee’s work program to include “matters relating to the implementation of Security Council resolution 1540, the universalization of additional protocols, the Agency’s relations with the Security Council and the future of small quantities protocols [SQPs].”⁵

The first meeting of the Advisory Committee was held in November 2005. At the request of member states, the Agency proposed a number of areas for the Committee’s consideration. Committee 25 met a few times over the two-year period, but, as indicated in the chair’s 2007 report on the work of the Committee, was unable to reach agreement on recommendations to submit to the Board. The Chair’s report noted, however, that, although the Committee had not been able to agree on any recommendations, it had provided “an important forum for constructive discussion and useful exchanges of view among Agency Member States on safeguards matters.” The Chair observed that the documentation and clarifications provided by the Secretariat to assist the work of the Committee had been particularly helpful in increasing the understanding and awareness of member states on important and current safeguards issues. The report also referred to the view expressed by several members that “efforts to strengthen the safeguards system must be an ongoing process and that the Agency should continue to work actively towards strengthening the safeguards system” and that “some of the issues and recommendations discussed by the Committee could be taken up in the future for further consideration as appropriate⁶.”

In his report on safeguards for the 2007 General Conference, the Director General described the work of Committee 25. In paragraph 6 of his report, he also noted that the Secretariat “continued to develop the state-level concept for the implementation and evaluation of safeguards.” The report went on to note that, “In the state-level concept, safeguards implementation and the evaluation of that implementation are based on a state-level approach (SLA), developed for each state. SLAs are developed on a non-discriminatory basis using safeguards verification objectives which are common to all states with [CSAs]. They also enable state-specific features, such as the state’s nuclear fuel cycle and the effectiveness of its state system of accounting for and control of nuclear material (SSAC), to be factored in.”⁷

In 2010, the Department of Safeguards presented the results of its long-term strategic plan for 2012–23, which stated that, in its efforts to focus its activities and resources where they mattered most in terms of achieving safeguards objectives, the IAEA would further develop the SLC and extend its application to all states (i.e. CSA states for which the broader conclusion had not been drawn, either because the IAEA had not completed

⁵ GOV/OR/1131, September 2005.

⁶ GC(51)/8, 23 July 2007, para. 3.

⁷ GC(51)/8, 23 July 2007, para. 6.

its analysis or because the state did not have an AP in force, or because the state had a voluntary offer or item-specific safeguards agreement).

Although some concerns were raised in 2011, there were no substantial challenges to the implementation of that concept until 2012, when several states actively challenged the SLC, with Russia leading that challenge. Among the issues raised by these states, both during the Board meetings and the 2012 General Conference, were: the prospect that application of the SLC could result in the IAEA making political and subjective judgments about states; the need for further definition of specific elements of the concept, such as what constituted safeguards relevant information and safeguards objectives; and the authority of the Secretariat to expand the implementation of the SLC without approval of the Board or General Conference.

In its 2012 safeguards resolution, the General Conference requested the Director General to report to the Board on the conceptualization and development of the SLC for safeguards. In response to that request, the Secretariat issued a report in August 2013 entitled “The Conceptualization and Development of Safeguards Implementation at the state Level.” The report provided background information on the evolution of safeguards and described the Secretariat’s development of state-level approaches under the SLC and their implementation in states with CSAs. In response to a Board request for additional information, the Secretariat initiated a series of technical meetings to brief member states on safeguards issues, which served as the basis for a supplementary document the Secretariat prepared for consideration by the Board before the General Conference met in September 2014 (GOV/2014/41 and Corr. 1). It provided further clarification and additional information and described how the SLC applied to states with voluntary offer safeguards agreements and to states with item-specific safeguards agreements.

In the intervening years, the IAEA Secretariat has convened a number of technical briefings for the member states on the implementation of various aspects of safeguards, including briefings on the status of the implementation of safeguards under the SLC and on the processes for developing state-level approaches. The Agency has also completed updating state-level safeguards approaches for all the states that were already under integrated safeguards at the start of 2015, and developed state-level approaches for eleven other states in 2016 (including a state with a voluntary offer safeguards agreement).

Possibilities for Future Collaboration on Safeguards

In 2016, the General Conference was able to achieve consensus on the safeguards resolution, without the traditional vote on the paragraph calling for universal application of IAEA safeguards.⁸ However, IAEA safeguards remain under stress. Among the current problems identified by the Secretariat are:

- Insufficient capacity for prompt analysis of environmental samples (with delays of six to nine months);
- The lack of state and regional regulatory authorities in many states and the inadequacy of many state systems for accounting and control of nuclear material;

⁸ GC(60)/RES/13 (2016).

- Delays in the modification or rescission of small quantities protocols based on the pre-2005 model⁹ in thirty-eight states; and
- The heightened risk to inspectors' safety and security in countries experiencing armed conflict.

There are other challenges. But there may also be opportunities – opportunities for collaboration between the Russian Federation and the United States to maintain the technical effectiveness of IAEA safeguards and to ensure that the IAEA is prepared to face current and future proliferation challenges.

Opportunities for Further Strengthening Safeguards

Twenty years have passed since the adoption of the Model Additional Protocol. The Annexes to the Model Additional Protocol are likewise twenty years old: Annex II, the list of specified equipment and non-nuclear material for the reporting of exports and imports according to Article 2.a.(ix), is based on a list derived from the Trigger List of the Nuclear Suppliers Group as it existed in 1996.¹⁰ The NSG Trigger List is now on its thirteenth revision,¹¹ and yet there has been no action to amend Annex II of the Model Additional Protocol. Article 16 of the Model Additional Protocol provides a simplified mechanism for the amendment of the Annexes to the Model Additional Protocol by the Board upon advice of an open-ended working group of experts established by the Board. Is there an opportunity to take advantage of “low hanging fruit” to update Annex II of the Model Additional Protocol?

Somewhat more ambitiously, consideration could also be given to the timeliness/advisability of reviewing the proposals for further strengthening safeguards developed during Committee 25 to see whether any of them could be re-opened for discussion and further development.

Technological Challenges and Opportunities

In operative paragraph 32 of GC(60)/RES/13, the General Conference encouraged the Secretariat “to enhance its technical capabilities and keep abreast of scientific and technological innovations that hold promising potential for safeguards purposes, and to continue building effective partnerships with Member States in this regard.”

In recent years, the global community has witnessed rapidly evolving disruptive technologies that could be useful for verification purposes, such as augmented reality, robotics, and remote-sensing technologies, as well as technologies that could pose serious risks to the nuclear non-proliferation regime and IAEA safeguards, such as additive manufacturing and cyber activity. There is also a trend to greater use of technology-based

⁹ The pre-2005 “small quantities protocol” operated to hold in abeyance most of the state’s obligations to report and the IAEA’s rights of access under a CSA if “the State [had] less than specified minimal quantities of nuclear material and no nuclear material in a facility.” For a discussion on the 2005 modification of the model SQP and the eligibility requirements, see GC(49)9 (22 July 2005), paras 2 and 3.

¹⁰ INFCIRC/254/Rev.2/Part 1/Add.1. As indicated in the footnote to Annex II of the Model Additional Protocol, the list contained in that Annex was based on a list (derived from the Trigger List of the Nuclear Suppliers Group) originally adopted by the Board at its meeting on 24 February 1993 for use in connection with the IAEA’s voluntary reporting scheme, and subsequently amended by the Board as of 1996.

¹¹ INFCIRC/254/Rev.13/Part 1.

information collection and analysis, a trend reflected in the IAEA's efforts to increase safeguards efficiencies and effectiveness.

What kinds of resources should be mobilized to ensure that the IAEA is using state-of-the-art verification technologies while anticipating technologies that might augment a state's ability to circumvent IAEA safeguards? What are the risks and benefits of moving toward a greater reliance on machine learning and algorithms?

DPRK

The Director General recently announced that he would enhance the Agency's readiness to play an essential role in verifying North Korea (the DPRK)'s nuclear program and that he would update the Board "in due course."

In the event of a diplomatic resolution to the problem of the DPRK's nuclear program, the resumption of verification activities will present many and varied challenges, starting with the nature of the DPRK's undertakings (cessation? freeze? rollback?) and the scope of IAEA's activities. As demanding as the implementation of the Joint Comprehensive Plan of Action (JCPOA, between Iran, the United States, the United Kingdom, France, China, Russia, Germany, and the European Union) is on the IAEA's human and financial resources, the demand for such resources in the face of a resumption of verification activities in the DPRK could be even greater.

In terms of the IAEA's activities, there may well be opportunities to take advantage of some of the technological developments and verification technologies referred to above. For example, earth-penetrating sensors might be useful for identifying and monitoring facilities buried underground or inside mountains.

Another factor to consider is how verification of the dismantlement and elimination of the DPRK's nuclear weapon program would be handled. Are the IAEA's experiences in Iraq and South Africa instructive for how to handle proliferation sensitive information? Should there be an effort to establish a special task group composed of specialists from nuclear-weapon states?

US-Russian cooperation was critical to securing the conclusion of the JCPOA in July 2015. Recognizing that the JCPOA is not intended to serve as a precedent "for any other State or for principles of international law and the rights and obligations under the Treaty on the Non-Proliferation of Nuclear Weapons and other relevant instruments, as well as for internationally recognized principles and practices," could the experience gained in its implementation inform states and/or the IAEA on effective verification in the DPRK or the process of achieving agreement on such verification?

Safeguards in Nuclear-Weapon States

In the 2016 safeguards resolution, there are four paragraphs that relate to verification and the NPT nuclear-weapon states (NWS):

- Preambular paragraph (p), which welcomes "the work the Agency has undertaken in verifying nuclear material from dismantled nuclear weapons";
- Preambular paragraph (r), which recalls "that the 2010 NPT Review Conference in Action 30 of the Final Document called for wider application of safeguards to

peaceful nuclear facilities in the [NWSs], under the relevant voluntary offer safeguards agreements”;

- Operative paragraph 19, which invites the NWSs to “keep the scope of their additional protocols under review”; and
- Operative paragraph 20, which “[n]otes that the Agency must remain ready to assist, in accordance with its Statute, with verification tasks under nuclear disarmament or arms control agreements that it may be requested to carry out by the States parties to such agreements.”

The modesty of P-5 achievements does not augur well. One of the reasons some states cite for not concluding an Additional Protocol is the lack of progress toward disarmament by the NWS. Frustration with the lack of progress in disarmament also resulted in the negotiation of “a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination.”¹² Disagreements engendered by these negotiations could further polarize the NPT review process and stall progress in safeguards and the universalization of the Model Additional Protocol.

During the US/Russia/IAEA Trilateral Initiative, Russian and US scientists cooperated extensively with a view to developing technical measures for verifying, without access to classified information, fissile material released from weapons programs as a contribution to their respective disarmament obligations. With a commonality of purpose and a shared interest in promoting the conclusion of Additional Protocols, what conditions would need to prevail for a resumption of similar kinds of cooperation in disarmament verification? And could the resumption of such cooperation contribute to the development of tools and techniques that would be valuable in achieving effective verification, should the IAEA be permitted to resume verification activities in the DPRK?

Transparency

The annual SIR is submitted to the Board of Governors for its consideration at its June meetings and reflects the safeguards conclusions drawn by the Secretariat for the previous year. The document, which is prepared by the IAEA Secretariat, could benefit from greater transparency, and clearer information about whether safeguards objectives are being met. To that end, it might be worthwhile to create an SIR Task Force.

The IAEA has been engaged in drawing safeguards conclusions for almost sixty years. With the agreement of the member states, the IAEA has, in the past twenty years, moved away from evaluations based on rigid quantitatively driven criteria to a more qualitative approach that takes into account all safeguards relevant information available to the IAEA about the state concerned. It would be useful to gain an appreciation of US and Russian views on the value of defining criteria for drawing and/or modifying conclusions, and whether there is a risk in calling for “criteria” that the IAEA would regress to the pre-1991 approach to safeguards implementation described by some as “just checking the boxes”?

¹² United Nations resolution A/RES/71/258, 23 December 2016; A/CONF.229/2017/CRP.1/Rev.1, 27 June 2017.