IAEA & NPT
THE VERIFICATION CHALLENGE

Challenging Nuclear Issues Point the Way Forward

by Jan Lodding & Tariq Rauf

Five years ago, member States of the global Treaty on the Non-Proliferation of Nuclear Weapons (NPT) agreed on a number of forward-looking elements for non-proliferation and disarmament and for the peaceful uses of nuclear technology. This was widely hailed as a major accomplishment for the global nuclear non-proliferation regime and for multilateral cooperation in this context. The NPT regime — a brainchild of the Cold War era — seemed strengthened and better adapted to meet the challenges of the 21st Century.

The elements were contained in the Final Document adopted by consensus of the 187 States parties at the 2000 NPT Review Conference, the sixth such Conference since the NPT's entry into force in 1970. Among 62 references to IAEA safeguards in the Final Document, the Agency's verification system was acknowledged as a fundamental pillar of the nuclear non-proliferation regime, one that plays an indispensable role in the Treaty's implementation and helps to create an environment conducive to nuclear disarmament and to cooperation in the peaceful uses of nuclear energy. The NPT States recognized that IAEA safeguards provide assurance of compliance and assist States in demonstrating compliance with their relevant undertakings. They recognized the IAEA as the competent authority responsible for verifying and assuring compliance with safeguards agreements, and expressed its conviction that nothing should be done to undermine its authority in this regard. Member States having concerns regarding non-compliance with safeguards agreements were called upon to direct such concerns, along with supporting evidence to the Agency for its consideration. The Final Document also supported steps for strengthening the IAEA's safeguards system and for the possible application of IAEA verification in the context of future nuclear disarmament.

This article deals with new developments over the past five years related to these verification challenges, from the IAEA's policy perspective.

Growing Responsibilities

Following the discovery of a clandestine nuclear-weapon programme in Iraq in the wake of the 1991 Gulf War, the IAEA refocused its work. The Iraq case showed that the Agency needed to verify both the correctness and completeness of States' declarations. States looked to the IAEA to provide credible assurance regarding not only the non-diversion of *declared* nuclear material, but also the absence of *undeclared* nuclear material and activities in States with comprehensive safeguards agreements (CSAs, the type concluded by non-nuclear-weapon States pursuant to the NPT) in force.

To accomplish this goal, it was determined that the IAEA required the legal authority to apply a number of safeguards strengthening measures. This authority was provided in part through the IAEA Board of Governors' reinterpretation of provisions of the standard NPT safeguards agreement (INFCIRC/153 (Corr.)), but mainly through the approval of the application of verification measures under a new legal instrument adopted in 1997, the Model Additional Protocol (INFCIRC/540 (Corr.)). Since the 2000 Conference, the number of States for which the Agency implements additional protocols has grown from 9 to 64 at the end of 2004.

These developments — along with an unprecedented intensity of new verification challenges in some States — led to a considerable increase in the IAEA's safeguards responsibilities. In recognition of this, IAEA Member States addressed a long-standing shortfall in the Agency's regular safeguards budget. It reached a new budget agreement in 2004 which will lead to an increase in the annual safeguards budget from approximately US $89 million in 2003 to US $108.7 million by 2007 in nominal terms. Some IAEA Member States have proposed that the IAEA Board of Governors consider setting up a special committee on safeguards and verification to consider ways of further improving the Agency's capability to monitor compliance with nuclear non-proliferation obligations.

Verification Challenges

In the past few years, some widely publicized nuclear issues have highlighted the IAEA's vital verification work in the context of the NPT.

Democratic People's Republic of Korea (the DPRK). Following allegations by the United States in October 2002 that the DPRK had an undeclared uranium enrichment programme, the DPRK announced the termination of the 1994 "Agreed Framework" between the US and DPRK, expelled Agency inspectors in December 2002, and in January 2003 announced its intention to withdraw from the NPT effective the next day. The IAEA tried to convince the DPRK to reverse its course and, when this did not occur, it reported the DPRK's further non-compliance with its NPT safeguards agreement to the UN Security Council, on 12 February 2003. The Council has taken no action on the matter thus far.

The status of the DPRK's NPT membership — and hence its NPT safeguards agreement — remains unclear, as it has still not been clarified to the IAEA by either NPT States, the NPT depositary States or the Security Council. The IAEA has welcomed the "six-party talks" that commenced in August 2003 and voiced its view that any solution to the DPRK nuclear issue should ensure that the Agency is provided the authority to provide credible assurance with regard to the correctness and completeness of the DPRK's nuclear material declarations and the dismantlement of any nuclear-weapon programme.

Iraq. The NPT Final Document in 2000 noted the Agency's inability to perform its Security Council verification mandate in Iraq and called upon Iraq to comply with its obligations. At the time, the IAEA's NPT-related activities in Iraq were limited to a yearly physical inventory verification pursuant to Iraq's NPT safeguards agreement. This situation prevailed until the resumption of the Security Council inspection mandate in September 2002 and NPT inspections continued up to the invasion of Iraq in March 2003.

At that time, the IAEA assessed that Iraq's former nuclear weapon programme, which the IAEA had previously rendered harmless, had not been re-generated and that only a few outstanding issues remained to be addressed. Today, the IAEA continues to have a dual mandate in Iraq — under relevant Security Council resolutions and under Iraq's safeguards agreement — and remains ready to resume verification activities once the security situation in Iraq improves.

Islamic Republic of Iran. In August 2002, following media reports on previously unknown nuclear facilities in the Islamic Republic of Iran, the IAEA requested a visit to the alleged sites of such activities. Iran eventually agreed, and in the related discussions, informed the Agency of a number of activities that should have been reported earlier under Iran's NPT safeguards agreement. Iran reiterated that it had embarked on a civilian nuclear power programme, and explained that it had refrained from declaring its activities in order to circumvent attempts to deny it technology.

To help restore confidence following these breaches of Iran's obligation to comply with its safeguards agreement, the IAEA Board subsequently called on Iran, as a confidence-building measure, to suspend voluntarily all further reprocessing and uranium enrichment-related activities pending provision of the assurances required by Member States and pending satisfactory application of the provisions of the additional protocol. Iran signed an additional protocol to its NPT safeguards agreement in December 2003 and pledged to apply it pending formal entry into force.

Acknowledged as a fundamental pillar of the nuclear non-proliferation regime, the IAEA's Verification system plays a fundamental role in the NPT's implementation.

Following consultations with France, Germany and the United Kingdom on a "grand bargain", Iran agreed to suspend its enrichment programme, and this pledge was eventually expanded to a full suspension of all enrichment-related activities in Iran. In November 2004, the Agency concluded that there was no indication of diversion of declared nuclear material. However, it also cautioned that, given past concealment efforts, it would take a long time to reach a conclusion on the absence of undeclared nuclear material and activities in Iran. The IAEA is continuing its efforts to reach such a conclusion through Iran's safeguards agreement and additional protocol, and, as requested by Iran and the IAEA Board, is also verifying the suspension of all enrichment activities in Iran.

Libyan Arab Jamahiriya. In December 2003, the Libyan Arab Jamahiriya informed the IAEA that it had been conducting a clandestine nuclear-weapon acquisition programme, and asked the Agency to verify its dismantlement. Later that month, the IAEA Director General, Dr. Mohamed ElBaradei, met with President Ghadaffi, and Libya pledged to act as if the additional protocol to its safeguards agreement were already in force.

Strengthening Nuclear Safeguards

The 2000 NPT Review Conference urged all concerned NPT States to bring into force comprehensive safeguards agreements with the IAEA as soon as possible. It endorsed the measures contained in the Model Additional Protocol, and encouraged all NPT States, in particular those with substantial nuclear programmes, to conclude additional protocols and bring them into force or provisionally apply them as soon as possible. It proposed a possible plan of action, to promote and facilitate the conclusion and entry into force of such safeguards agreements and additional protocols.

The same year, the IAEA's General Conference outlined five "elements" of such an Action Plan, including intensified efforts by the Director General to conclude safeguards agreements and additional protocols, assistance by the IAEA and Member States on the implementation of additional protocols, and reinforced coordination of these efforts.

Guided by this mandate and its own outreach plan, the IAEA has been engaged since 2001 in an ambitious programme to inform national decision-makers about the policy, legal and technical aspects of the strengthened safeguards system.

IAEA Outreach for Stronger Safeguards

November 2001-December 2004

Events include those related to safeguards agreements, additional protocols, and the strengthened safeguards system

Outreach Event	Venue, time
Interregional Seminars 33 participating States	Vienna, November 2003 (For States without safeguards agreements); Vienna, November 2004 (For States that had not attended a regional seminar)
Regional Seminars More than 120 participating States	Peru, December 2001 (Latin America/Caribbean); Kazakhstan, January 2002 (Central Asia/South Caucasus); South Africa, June 2002 (Africa); Romania, February 2003 (Central and Eastern Europe); Malaysia, April 2003 (Southeast Asia); Uzbekistan, June 2003 (Central Asia/South Caucasus); Burkina Faso, February 2004 (Western Africa); Namibia, March 2004 (Southern Africa); Australia, November 2004 (South Pacific)
National Seminars	Thailand, March 2003; Malaysia, April 2003; Colombia, December 2003; Mexico, January 2004; Switzerland, July 2004; Philippines, November 2004
Seminars for NPT Parties	Geneva, May 2003; New York, May 2004
National and Regional Technical Courses and Workshops More than 100 participating States	Japan, Feb./March 2002 (regional); Ukraine, April 2002 (regional); Switzerland, May 2002 (national); Algeria, June 2002 (national); Japan, Nov./Dec. 2002 (regional); Vienna for Iran, Sept. 2003 (national); South Africa, Oct. 2003 (regional); Kazakhstan, Oct. 2003 (national); Chile, November 2003 (national); Japan, Dec. 2003 (regional); South Africa, October 2003 (regional); Australia, June 2004 (regional); Switzerland, Sept. 2004 (national); Kazakhstan, Nov./Dec. 2004 (regional).
Expanded Negotiations in Vienna	Albania, Belarus, Morocco, Saudi Arabia, Switzerland, Tunisia, Ukraine

The aim is to conclude, by the end of 2005, safeguards agreements with many of remaining NPT parties, and additional protocols with the majority of States and almost all States with significant nuclear activities. A number of States have

In February 2004, the Director General reported that Libya, over an extended period of time, had failed to report nuclear material, facilities and activities, including such related to uranium enrichment. He characterized Libya's breach of its safeguards obligations, and its acquisition of nuclear weapon design and fabrication documents, as matters of the utmost concern.

According to Libya, a foreign expert had helped the country gain experience in the design and operation of centrifuge equipment in the 1980s, and in 1995 Libya made a strategic decision to pursue gas centrifuge enrichment technology. Related components were procured from abroad, although Libya had intended to establish domestic capabilities. Research was also conducted into uranium separation and weaponization.

In March 2004, the IAEA Board requested the Director General to inform the UN Security Council of Libya's past non-compliance. By September 2004, the Director General reported that, with the good cooperation of Libyan authorities, the IAEA had built an understanding of Libya's previously undeclared nuclear programme.

The report pointed out that the IAEA's analysis of Libya's nuclear programme had brought to light a covert network,

assisted in these efforts through extrabudgetary contributions and in-kind support, including Australia, Burkina Faso, China, Finland, France, Japan, Kazakhstan, Malaysia, Namibia, Peru, South Africa, Sweden, the United States and Uzbekistan. Japan has taken a leading role in international outreach efforts.

More than 150 States have been engaged in consultations on the conclusion of safeguards agreements and additional protocols through IAEA regional, interregional and national seminars since December 2001.

In the IAEA Secretariat's estimation, remaining obstacles encountered by States to the conclusion of safeguards agreements and additional protocols can be divided into four groups:

❶ Technical factors, including the need to establish a functioning State System of Accountancy for and Control of Nuclear Material (SSAC).

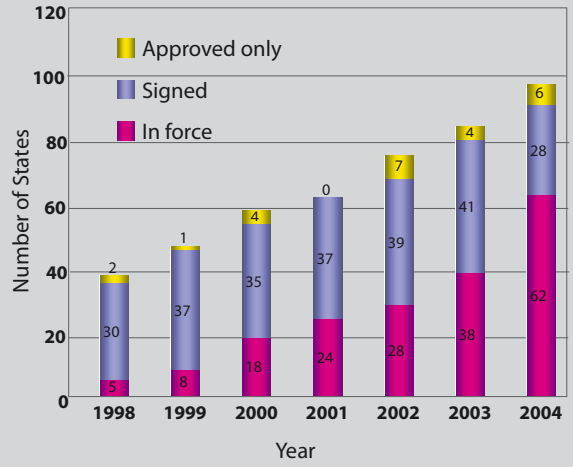
❷ Legal factors, such as the lack of understanding of the legislative requirements of safeguards agreements and additional protocols.

❸ Administrative factors, for instance a lack of working relations between the line ministry dealing with International Atomic Energy Agency affairs and Government officials responsible for the conclusion of international agreements.

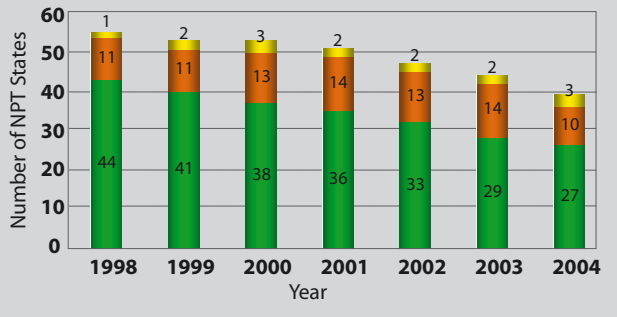
❹ Policy factors, such as competing priorities and the expectation of economic or security benefits "in return for" the conclusion of safeguards agreements and additional protocols.

Since the 2000 NPT Review Conference, 14 States have brought into force comprehensive safeguards agreements and 55 States party to the NPT have brought into force additional protocols. At the start of 2005, 40 NPT States had outstanding obligations to bring into force safeguards agreements.

Conclusion of Additional Protocols
1998-2004 (cumulative)



Outstanding NPT Safeguards Agreements
1998-2004 (cumulative)



About half of the NPT States have submitted additional protocols for signature. Though still below expectations in the late 1990s, the accelerated rate of adherence to the strengthened safeguards system is a key area where progress has been achieved since the last Review Conference.

For more information visit www.iaea.org/img/assets/3871/Action_Plan_2004.pdf

through which Libya and other States gained access to nuclear technology and know-how.

Republic of Korea. In August 2004, in connection with the submission of its initial declaration under the additional protocol, the Republic of Korea announced that in 2000, the Korea Atomic Energy Research Institute had conducted uranium enrichment experiments, without the Government's knowledge, that should have been reported to the Agency. It later emerged that experiments on uranium and plutonium separation had also taken place about 25 years ago. The IAEA Director General reported these findings to the Board, in November 2004, expressing serious concern with the failure to report such undeclared activities, but underlining that there were no indications that these experiments had continued. The Board shared the Director General's serious concerns with regard to failures to report information under the Republic of Korea's safeguards agreement with the IAEA.

Disarmament Verification

The NPT Final Document in 2000 included steps toward nuclear disarmament, some of which made reference to verification issues. Specifically cited was the completion and implementation of a "Trilateral Initiative" between the

USA, the Russian Federation and the IAEA and arrangements by all nuclear-weapon States to place excess fissile material under IAEA or other relevant international verification.

Since then, studies and workshops continued within the framework of the Trilateral Initiative, until September 2002, when the three parties declared that the task entrusted to the Trilateral Initiative Working Group in 1996 had been fulfilled. At that stage, the Trilateral Initiative had demonstrated technical approaches for multilateral verification of irreversible removal of excess plutonium from military programmes, developed a legal framework for verification arrangements to be applied to ex-weapon and other excess material, and proposed possible models to finance such arrangements.

Other disarmament steps agreed by NPT States in 2000 might potentially influence the IAEA's work. They include the negotiation of a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices, as well as the agreement to apply the principles of irreversibility and transparency to nuclear disarmament measures.

Although formal negotiations on a Fissile Material (Cut-off) Treaty at the Conference on Disarmament in Geneva have not taken place, the IAEA has continued to participate in — and Agency experts have provided information — to informal discussions in Geneva to consider the technical aspects of an eventual treaty.

The IAEA remains ready to consider any request to undertake verification tasks related to excess fissile material but so far has not received any such requests.

Learning from Experience

The IAEA has extensive experience in verifying nuclear programmes. Recent developments have put its strengthened safeguards system to the test and brought a number of highly topical issues to the forefront:

The Impact of the Additional Protocol. The Model Additional Protocol constitutes the centerpiece of the IAEA's response to the 1991 Iraq crisis, aiming to strengthen the effectiveness and improve the efficiency of the safeguards system as a contribution to global non-proliferation objectives. It is designed to provide additional verification authority needed to derive credible assurance of the absence of *undeclared* nuclear material and activities. Once such conclusions are reached for a State with significant nuclear activities, the implementation of integrated safeguards approaches may lead to a reduction of inspection frequency and savings in the cost of verification for both the State and the Agency. At the time of the 2000 NPT Review Conference, only nine countries had additional protocols under implementation, and the system was virtually untested.

The case of the Republic of Korea suggests that the implementation of the measures in the additional protocol could lead to the discovery of previously unreported nuclear activities involving small quantities of nuclear material in other States.

The combined application of the measures of CSAs and additional protocols provides the technical basis on which the IAEA can draw expanded conclusions about a State's nuclear material and activities. For the year 2003, on the basis of its verification activities and evaluations, the Agency concluded, with regard to 19 NPT States with CSAs, that all nuclear material had been placed under safeguards and remained in peaceful nuclear activities or was otherwise adequately accounted for. Such conclusions contribute to the strengthening of the NPT by building confidence that participating States are complying fully with their treaty obligations. The IAEA has emphasized that additional protocols are a *sine non qua* for effective verification and that they must become the standard for all NPT States to enable the Agency to fulfill its verification responsibilities in a credible manner. By the end of 2004, 62 States had additional protocols in force.

The legal authority provided by the additional protocols also plays a vital role in the implementation of safeguards in Iran and Libya, where such protocols are applied pending entry into force, and in the Republic of Korea, which provided outstanding information on past research in connection with its initial additional protocol declarations. The case of the Republic of Korea suggests that the implementation of the measures in the additional protocol could lead to the discovery of previously unreported nuclear activities involving small quantities of nuclear material in other States, which might in some cases need to be reported to the IAEA Board of Governors.

Although integrated safeguards approaches are being implemented in a few States with nuclear activities, the IAEA's experience in States with complex nuclear programmes remains limited. The first case of integrated safeguards implementation in such a country, Japan, began in September 2004.

Covert Nuclear Trade. A major new development has been the discovery — in connection with IAEA safeguards implementation in Iran and Libya — that some States had been turning to nuclear supply networks in order to construct facilities capable of producing nuclear material. This cast in doubt the effectiveness of States' export control systems and of cooperative arrangements of supplier state governments to control transfers of nuclear items. It further precipitated the adoption of UN Security Council Resolution 1540, which calls for strengthened national export controls related to Weapons of Mass Destruction (WMD) material.

The IAEA, as part of its verification work in Libya and Iran, is investigating, with the support of Member States, the supply routes and the sources of sensitive nuclear technology and related equipment and nuclear and non-nuclear materials. It has discovered that the covert networks comprise dozens of companies in more than 30 countries around the world, whereby actual technological know-how may originate from one source, while the delivery of equipment may take place through intermediaries that play a coordinating role, subcontracting the manufacturing to entities in yet other countries. Sometimes, the original supplier might not know the actual end use, while in other cases the identity of equipment such as serial numbers are removed indicating complicity by the supplier.

The IAEA will continue to work with Libya and other Member States to gain a better understanding of the workings of the covert nuclear trade networks, with a view to ensuring that sensitive nuclear technologies and equipment have not proliferated further.

A major new development has been the discovery that some States had been turning to a covert nuclear supply network in order to construct facilities capable of producing nuclear material.

Enrichment and Reprocessing. The IAEA's verification experience has brought to the forefront the special difficulties surrounding technologies for enrichment and reprocessing. The Director General has called the acquisition of capabilities covering the full nuclear fuel cycle tantamount to a latent nuclear weapons programme. In its introductory statement to the 3rd session of the Preparatory Committee to the 2005 NPT Review Conference, the IAEA referred to the wide dissemination of the most proliferation-sensitive parts of the nuclear fuel cycle as the "Achilles heel" of the nuclear non-proliferation regime. The DPRK's attempts to "break out" from the NPT regime after having acquired reprocessing capabilities illustrate the problem.

In view of the sensitive, dual-use nature of technologies for enrichment and reprocessing, it would contribute to peaceful trade and confidence-building if States could agree freely on multilateral approaches to limit the proliferation of such technologies. In October 2004, IAEA Director General ElBaradei appointed an expert group to help the international consideration of multilateral approaches to the sensitive front- and back ends of the nuclear fuel cycle and to report by March 2005, in the hope that the NPT Review Conference in May 2005 might be in a position to make progress on that issue.

The Way Forward

When NPT States meet in May 2005 to review and assess the way forward, they will have to address a number of difficult verification matters. They include the attempt of one NPT State to break out from its safeguards obligations, breaches of safeguards agreements by several NPT States, a lack of progress on verification of excess nuclear material, the discovery of covert nuclear trade networks and the special difficulties associated with the dissemination of enrichment and reprocessing technologies.

Some of these issues will require that States address the delicate balance between different provisions of the NPT, and test their political will to make concessions and find compromises in the common interest of strengthening the Treaty. One of the most important measures before NPT States will be to strengthen verification pursuant to Article III by confirming the role of the IAEA Model Additional Protocol as the NPT verification standard.

The IAEA, for its part, will continue to fulfill its mandate of providing credible assurance to the international community that States are honouring their non-proliferation undertakings, on the basis of the legal authority imparted through IAEA safeguards agreements and additional protocols. The effectiveness and efficiency of the strengthened safeguards system will surely continue to be put to the test, as the IAEA meets new verification challenges in the coming years.

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More information on the IAEA and the NPT and on specific verification issues is available on www.iaea.org.