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*The 45-year old NPT anchors states' commitment to prevent the diversion of nuclear energy to nuclear weapons. The IAEA's 40-year old Model Comprehensive Safeguards Agreement (CSA) premises its verification standard on the early detection of diversion of nuclear material to nuclear weapons or purposes unknown. The Agency's mission in ensuring that nuclear uses remain solely peaceful has been challenged and remains the case in North Korea, Iran, and Syria. There are lessons to be drawn from the IAEA's inspection process concerning these countries, and in that context, future adjustments of safeguards methods to consider. The IAEA conducted inspections in Iran under the CSA with and without an Additional Protocol (AP), in Syria under the CSA, and in North Korea under the CSA with certain restrictions. In all three cases, the Agency sought transparency visits in the early stages to understand claims on possible undeclared activities, and pursued added measures in later years. While there are similarities in all the three dossiers, there are also differences. The IAEA's state-level approach implemented across the board over the last decade is the result of creating better understanding of each state's nuclear activities. Internally, safeguards methods have also evolved from a material accountancy approach to a more pro-active, analytical and comprehensive evaluation process. Examples are given on a range of issues that the IAEA seeks to advance its safeguards approach. These include: emerging verification problems; use and sharing of third party information; issues associated with IAEA reporting practices; and states' deception and concealment strategies.*

**Introduction**

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which anchors state parties' commitment to prevent the diversion of nuclear energy to nuclear weapons, entered into force more than 40 years ago. Since then the world has undergone rapid social, political and economic changes, which have resulted in a changed and continuously evolving non-proliferation landscape. In response, nuclear safeguards carried out by the IAEA have undertaken its own changes to improve its verifications activities. However, member states' enthusiasm to fix safeguards deficiencies have been mixed.

The IAEA's 40-year old Model Comprehensive Safeguards Agreement (CSA) premises its verification standard on the early detection of diversion of nuclear material to nuclear weapons or purposes unknown<sup>1</sup>. The Agency's mission in ensuring that nuclear uses remain solely peaceful has been challenged and remains the case in North Korea, Iran, and Syria.

Over time, several developments have also impacted on nuclear non-proliferation efforts:

- the increased dissemination of nuclear technology and nuclear "know-how", particularly in light of renewed interest in nuclear power;
- a renewed drive on the part of a few States to acquire technology suitable for nuclear weapons purpose – to become virtual nuclear weapons states;
- the emergence of clandestine procurement networks providing sensitive technologies, nuclear materials and nuclear weapon designs; and
- the risk of nuclear terrorism.

In a number of instances, the international community has responded to proliferation 'shocks', namely by adding on supplementary arrangements but without changing the original text of the NPT or modifying the CSA. The Indian nuclear test in 1974 gave the birth to the Nuclear Suppliers Group (NSG). The revealed Iraqi nuclear weapons program led the IAEA Board to review the legal authorities of the Agency, which in turn led to the strengthening of safeguards. These included: the early provision of the design information, additional tools such as the environmental sampling, and enhanced information analysis, where the IAEA assesses the nuclear program of a state as a whole and not merely based on nuclear material verifications<sup>ii</sup>. Additional access rights were embodied in the Additional Protocol (AP)<sup>iii</sup> introduced in 1997 and currently adopted by 120 states<sup>iv</sup>. The loophole of the Small Quantities Protocol (SQP)<sup>v</sup> that holds in abeyance the implementation of most of the safeguards measures, including inspection rights, was fixed by modifying it in 2005

Developments were also taking place outside the IAEA. Concerns over illicit trafficking of nuclear and radioactive material and threats of nuclear terrorism led to additional arrangements at the multilateral and plurilateral levels. These included, inter alia, the Wassenaar Arrangements, United Nations Security Council Resolutions 1540 and 1887, and the Nuclear Security Summits. In this regard, it can be stated that the IAEA remains a cornerstone but not the sole point of nuclear non-proliferation efforts.

### **A Changing Nuclear Verifications Environment**

Nuclear non-proliferation threats are real, as demonstrated by the following few examples:

- Continuing seizures of nuclear and radioactive materials, such as the confiscation of weapons-usable nuclear material in Georgia and Moldova in 2010 and 2011, demonstrating that such materials remain in illegal circulation and could be acquired by terrorists or proliferators;
- The sale of UF<sub>6</sub> from North Korea to Libya;
- The transfer of reactor technology from North Korea to Syria;
- Numerous interdictions of illicit dual-use shipments; and
- Trading of sensitive uranium enrichment, reprocessing, and nuclear weapons technologies.

Interdictions are only a part of the equation. We also need to keep in mind that Weapons of Mass Destruction programs are closely held, compartmentalized, and guarded secrets of any nation. Nuclear programs for Non- Nuclear Weapons States (NNWS) seeking to achieve nuclear weapons or weapons capability are no exception. Implicit in this is the notion of concealment and ambiguity. This could be reflected in the thinking of the Pakistani leadership, which also indicate that such programs are resolute:

*"Pakistan will fight, fight for a thousand years. If ... India builds the [Atom] bomb.... [Pakistan will eat grass or [leaves], even go hungry, but we [Pakistan]will get one of our own [Atom bomb]...We [Pakistan] have no other choice!.."<sup>vi</sup>*

Another fundamental part of the strategy to obtain nuclear capabilities is to develop indigenous capabilities, as reflected in the thoughts of A. Q. Khan:

*"We devised a strategy by which we could go all out to buy everything that we needed in the open market to lay the foundation of a good infrastructure and would then switch over to indigenous production as and when we had to do. My long stay in Europe and intimate knowledge of various countries and their manufacturing firms was an asset."<sup>vii</sup>*

Once such a capability has been achieved, it is difficult to dismantle: *"North Korea's nuclear weapons are a "treasure" not to be traded for "billions of dollars," the statement said. They "are neither a political bargaining chip nor a thing for economic dealings to be presented to the place of dialogue or be put on the table of negotiations aimed at forcing (Pyongyang) to disarm itself"<sup>viii</sup>*

### **What This All Means**

As the IAEA's experiences on Iran, Syria and North Korea demonstrate, confronting governments suspected of harboring clandestine nuclear activities is never straightforward. It is also problematic. Too little evidence and the country will simply deny its veracity and ask for more proof. But if too much evidence is shared, this could compromise the source of the information and set investigations back in a number of ways.

The IAEA's experience also demonstrates a cost-benefit balance to weigh in watching a country's program and gathering information. Political considerations also factor in the process. It can be a case of being too late – a country can reach a point of no return with its nuclear program / nuclear capabilities.

Once a country has reached indigenous capabilities to move towards the nuclear threshold, further attempts to restrict imports or procurement can only check progress to an extent. As nuclear capabilities progress, the problem may become clearer to the outside world, but stopping it becomes much harder. As the capabilities of the state grow, we may likely know less about them.

From a safeguards perspective, this emphasizes the importance of fully understanding current as well as past scopes and contents of nuclear programs,

to ensure that all nuclear material and activities, including dismantled capabilities, be declared.

The strength of the IAEA safeguards is its access to sites, facilities, materials, equipment and people. This paper discusses a number of approaches to consider, noting that there is no *"silver bullet"* to creating 100% credibility, and that there is *"no one size, which fits all" mould*. We ought to remember that yesterday's success does not guarantee tomorrow's triumph. If, for example Iran becomes a nuclear weapons state, it is possible that in the coming years that we would see a cascade of proliferation across the Middle East. General James Mattis, Commander of US Central Command, stated in March 2013 that "at least one other nation has told me" it would also obtain a nuclear capability if Iran develops the bomb<sup>ix</sup>. Prince Turki al-Faisal, long-time head of intelligence of Saudi Arabia has said that if Iran obtains weapons of mass destruction, "we must, as a duty to our country and people, look into all options we are given, including obtaining these weapons ourselves"<sup>x</sup>. Similar views have also been expressed in North East Asia<sup>xi</sup>.

Proliferators learn from their lessons, hence the constant need for inspectors to say ahead of the game. Otherwise, international safeguards verification risks providing not only a false sense of security, but at the end also the agreements and the organizations could become irrelevant.

The following are topics to be discussed and suggestions are offered with the framework of the IAEA.

### **Lesson 1 - Handling Emerging Problems**

Generally the IAEA Secretariat does not bring safeguards implementation problems to the attention of its policy making organs at an early stage. The Agency has traditionally brought them to the attention of the said country in question to resolve the matter in the first instance. More often than not, in so doing, officials attempt to resolve issues quietly. This may work in certain cases but in other cases it fails to expose a larger problem. This is also the case where in using soft approaches such as transparency measures to seek cooperation and information, there is a reluctance to move away from such a process even if it is not working.

In a recent statement to the press, Mr. Amano said that the IAEA's discussions with Iran has been going around in circles, and that "Despite the intensified dialogue between the Agency and Iran since January 2012, during which time 10 rounds of talks have been held, no agreement has been reached"<sup>xii</sup>. This not only expresses frustration over present negotiations of a two-and-a-half page long document to address open issues related to the possible military nature of Iran's nuclear program, but it can also be taken to highlight the nuclear strides in which Iran has progressively made over time, despite numerous UN Security Council and IAEA resolutions, and related sanctions imposed. In 2003, Iran did not have any operating uranium mines, no uranium conversion facility, and no uranium enrichment plants. According to the latest IAEA report<sup>xiii</sup>, Iran has now two mining and milling facilities, a uranium conversion facility, a fuel fabrication plant, a large heavy water reactor approaching its completion, and two uranium

enrichment facilities with 16000 IR-1 centrifuges installed, and another 3000 centrifuge unit with more advanced IR-2m centrifuges under installation. Parallel to stalling on negotiations with the IAEA and the P5+1, Iran continues to build substantial nuclear capability without demonstrating the peaceful nature of its nuclear efforts, all the while seeking to undermine the authorities of the IAEA and the UN Security Council.

### **Lesson 2 – When to Ring the Bell**

With safeguards implementation problems on non-compliant states, the IAEA Secretariat should periodically issue stand-alone written reports that include all items of concern and developments. Apart from providing a holistic picture, it continues to convey the seriousness and urgency of outstanding safeguards issues that stand apart from the bureaucratic updating the IAEA's activities. Focus should be maintained on non-compliant states, such as public statements issued at the same time that reports are sent to the IAEA Board. Here, misinformation provided by the inspected state should also be noted in addition to reflecting responses the IAEA has received to questions raised.

It is also important to report regularly on emerging safeguards problems, even where no progress has been made, especially since a lack of cooperation could be one form of non-compliance down the road.

Timing is always a tricky issue and this is no different for the IAEA in time, manner and nature of releasing information. But this does not mean new thinking should not be considered to address how things have been traditionally done. The Secretariat should consider the benefit of highlighting emerging problems, e.g. in the introductory remarks in the Board meetings, technical briefings or in the Safeguards Implementation report, as they start to emerge. There is a tendency for problems getting more wicked at a later stage closing possibilities for easy solutions.

Prompt and clear reporting will enable the member state(s) in question to make their own risk assessment and act on them. It could also have the consequence of reaching civil society, whistleblowers, etc., who may have findings to share with the IAEA. In this regard, it is worth considering making the entire annual Safeguards Implementation Report available to the public with the understanding that it does not contain proprietary sensitive information.

### **Lesson 3 – Transparency Visits and Their Limitations**

When information regarding possible undeclared activities in Iran started to emerge in the early 1990's, the IAEA leadership employed transparency visits to investigate allegations on undeclared nuclear activities as well as inconsistencies on nuclear material declarations, where access rights under the safeguards agreement could have been used. This has been particularly true when access to undeclared and military sites has been sought. In seeking clarifications, transparency visits were often made by senior management.

Looking back, these transparency visits to Iran provided a false sense of security, both internally within the IAEA as well as externally to the larger international community. The IAEA provided assurances through press statements following each of the various transparency visits made to Iran without inspectors taking environmental samples (with one exception) or more technical details that needed to be provided to the Secretariat by Iran for better analysis. This significance cannot be understated since inspectors *did* come up with proof of undeclared nuclear material on the one occasion.

Short of an implemented Additional Protocol that provides the legal basis for more intrusive inspections, transparency visits also remained at the behest of the 'goodwill' of the inspected state. The limitations of transparency visits were moreover not well understood by the Board and the public. As such, it was not obvious that assurances made by the IAEA through press statements etc. that no evidence were found concerning external reports of undeclared nuclear activities undertaken in Iran at sites visited by the IAEA<sup>xiv</sup>, were not derived as a result of rigorous safeguards carried out. Similar statements can be found from the interviews given by H. Blix<sup>xv</sup> <sup>xvi</sup> and M. Elbaradei<sup>xvii</sup>. Defending the IAEA's role and reputation is a natural reaction by its management but this can also have its limitations – resulting in over-sensitivity on weaknesses exposed.

Iran, on its part, took advantage of the statements of assurances made by the IAEA coming from the said transparency visits and requested to issue an INFCIRC/406<sup>xviii</sup> showing that there were no issues of concern on its nuclear program. In the ensuing years, Iran has continued to borrow from this playbook of taking portions from the IAEA DG's safeguards reports to highlight and quote the 'favorable' portions without its full context.

In more recent times, Iran has taken portions from statements provided by inspectors visiting Iran to highlight their cooperation. In addition, Iran has issued many explanatory notes and rebuttals that have been circulated, at its request, as INFCIRC documents to the Board as 'rebuttals' to the IAEA reports on Iran. As a general rule (with a few exceptions), the Secretariat does not / chooses not to respond or correct Iran's INFCIRC documents for a variety of reasons.

IAEA Board resolutions have frequently asked inspected states, e.g. Iran and Syria, to cooperate with the IAEA. However, obtaining such cooperation that addresses specific concerns that go beyond 'usual' safeguards implementation needs to be distinct from the state meeting its reporting obligations. Any form of interaction and response to the Secretariat by the state that is portrayed as 'cooperating' on the latter results in the misuse of the term or it being used too loosely. The professionalism of the Agency is reflective in working with the inspected state and getting the facts correct.

#### **Lesson 4 – How to deal with Concealment and Deception**

As the cases of Iraq, North Korea, Iran and Syria have repeatedly demonstrated, states extensively use various strategies to cajole, delay and hamper IAEA investigations.

The dilemma the Secretariat faces, given the nature of investigative procedures, is that it has to meticulously review each claim submitted by the investigated party, spending a fair amount of time as well as analytical resources, including providing additional samples to refute or confirm any claim. Changing explanations from the inspected state also slow down the Secretariat and is clearly not in the latter's favor given that each claim as to be processed and in most cases, time spent to refuted such claims. While the investigations are stalling the inspected party remains in non-compliance but continues to build its nuclear capabilities – clandestine or otherwise, or both.

There is also a need to rethink the approach to dealing with cases where the inspected party drags and stalls on issues, while weighing the procedures and need to maintain a high standard of corroboration of information and due process in information received from the inspected state party. Due to circumstances, the Agency will always be at a disadvantage compared to an inspected state. At the same time, there should be ways sought to reduce this imbalance while maintaining overall credibility of the Agency in processing information.

#### **Lesson 5 - The Dilemma of the Front End of the Fuel Cycle**

Throughout the IAEA's safeguards history, non-compliant states used mainly undeclared nuclear material often at undeclared facilities to avoid detection. For example, material were drawn from stocks of yellow cake not subject to safeguards verification measures, or from nuclear material exempted from safeguards verification activities, which were then converted and processed further without reporting to the IAEA. Such unreported uranium conversion activities were also carried out using equipment available at declared conversion and fabrication plants to manufacture fuel rods or targets.

Though the quantities of nuclear material in these cases were small, it reveals the vulnerability of safeguarding the front end of the nuclear fuel cycle. Such steps should also be potential signs for the Agency to be alert to possible diversion. It would be relevant to note that all proliferation cases of last two decades have exploited the front-end cycle weaknesses of safeguards.

The IAEA Secretariat would benefit from a review of how open source analysis missed out on some of the activities in Syria and Egypt, which should have been reported to the IAEA. A further look at whether the information available from IAEA technical operation project records were thoroughly analysed would also be useful.

While not directly under safeguards scope, the Secretariat should investigate whether the shipment of ores with high uranium content constitutes a proliferation risk and be alert to such activities surrounding cases of concern. For instance, in Finland two companies separate uranium as a by-product from imported minerals and report their inventories to the IAEA<sup>xix</sup>.

#### **Lesson 6 – Intelligent Use of Intelligence Information**

IAEA safeguards conclusions are based on the assessment of all information available from state declarations, inspection findings, third parties, and open sources. The IAEA also receives occasional briefings from a number of member states or companies. This information, which remains crucial to the IAEA's work, serves as lead information. Third party information has proven useful as in the cases of Iraq, North Korea, and Iran. The use of all information provided to the Agency goes through a rigorous process of internal IAEA corroboration and a combination of facts.

There are clear downsides to the indiscriminate sharing of all information, and in particular intelligence information presented to the inspected party - both from the investigative tactical angle as well as protection of source information.

The more recent approach by the IAEA in some instances to share information in the form of all data and documentation with the inspected state is a questionable approach. As the results information sharing requests are also appearing in the Board resolutions, which gives, e.g. to Iran, the opportunity to continue to press its case not to answer questions unless it receives information in its original form.

There have been discussions as to whether the IAEA, or the UN, should have special units to deal with such information. As the following quotes highlight, views are at variance:

- *It isn't realistic for an international organization to have an independent intelligence unit. (M. ElBaradei, October 2005);*
- *It has become time for the IAEA to set-up an intelligence unit. (R. Mowatt-Larsen, April 2009); and*
- *We cannot inspect every nook and cranny..... We cannot sit on intelligence information pointing to clandestine activities. (H. Blix in the debates on Iraq and strengthening of safeguards in early 1990s).*

Whatever the opinions held, it remains key for the IAEA Secretariat to maintain its independence and ensure that all third party information gets appropriately corroborated.

## **Conclusion**

Very few things in the world are perfect. As the proverb goes, better a raw diamond than a perfect pebble. Hence, by and large, the NPT and IAEA Safeguards remain a success story. The nightmare foreseen in early 1960's by President Kennedy - "the possibility in the 1970s of the President of the United States having to face a world in which 15 or 20 or 25 nations may have these weapons"<sup>xx</sup> - did not materialize. As the recognized international authority charged to verify the peaceful nature of nuclear programs, it is, however, important to evaluate, on an on-going basis, the IAEA's work. This includes its ability to adapt to current environment, its full use of inspection rights, and the nature of reporting of its findings. In addition, information possessed by other organizations or within member states that would greatly beneficial the IAEA's mission to provide credible assurances that nuclear energy is used only for



peaceful purposes, should be facilitated to make sharing of information with the IAEA easier. Preventing the diversion of nuclear energy to nuclear weapons is a continuous task. The credibility of the verification systems requires it to stay ahead of proliferators; otherwise it risks becoming irrelevant.

<sup>i</sup> INFCIRC/153 (Corrected), The Structure and Content of Agreements between the Agency and States Required in the Connection with the Treaty on the Non-proliferation of Nuclear Weapons.

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<sup>ii</sup> In 1992, the IAEA Board of Governors affirmed that the scope of comprehensive safeguards agreements was not only limited to nuclear material declared by a State, but included any material that is required to be declared under its CSA. In other words, the IAEA Board confirmed that the Agency has both *the right and obligation* not only to verify that declarations of nuclear material subject to safeguards are 'correct' (i.e. they accurately describe the type(s) and quantity (ies) of declared nuclear material inventories), but that they are also 'complete' (i.e. that they include everything that should have been declared by the State). [Soundly based safeguards conclusions regarding 'completeness,' in States with comprehensive safeguards agreements in force, depend on the extent to which the Agency is equipped to detect undeclared nuclear material and activities in such States.]

<sup>iii</sup> INFCIRC/540 (Corrected), Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards.

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<sup>iv</sup> Y. Amano, Director General, Introductory Statement to Board of Governors, IAEA, 3 June 2013.

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<sup>v</sup> In 1971 the standard text of the SQP was introduced, and was available to States which had less than specified quantities of nuclear material, which do not exceed the limits set out in paragraph 37 of INFCIRC/153). This gives to States the option to conclude a SQP that holds in abeyance the implementation of most of the detailed provisions set out in Part II of the CSA as long as these conditions continue to apply. In 2005 this text was revised, and those States, who have accepted the modification, force now need to: (i) submit to the Agency an initial report on their nuclear material; (ii) inform the Agency as soon as a decision has been taken to build a new facility; and (iii) enable the Agency to conduct verification activities in the field, should it need to do so.

<sup>vi</sup> Zulfikar Ali Bhutto, Foreign Minister of Pakistan, October 1965.

<sup>vii</sup> Malik, Dr. Khan and the Islamic Bomb, 93-94.

<sup>viii</sup> Foster Klug, NKorea calls nukes country's 'life' at big meeting, Associated Press, 31 March, 2013.-

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<sup>ix</sup> Martinez L and Ferran L (2013) 'US Gen: an Iranian nuke would spark arms race', ABC News, 5 March 2013.

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<sup>x</sup> 'Saudi Prince Turki urges nuclear option after Iran', Reuters News website, 6 December 2011.

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<sup>xi</sup> David Sanger, 'In U.S., South Korean makes case for nuclear arms', New York Times, 9 April 2013.

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<sup>xii</sup> 'UN, Iran nuclear talks 'going around in circles' - UN official', UN News Centre, 3 June 2013.

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<sup>xiii</sup> Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran, GOV/2013/27, 22 May 2013.

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<sup>xiv</sup> Press Release 92/11, 14 February 1992, IAEA.

<sup>xv</sup> "Rafsanjani Gives Assurances on NPT to IAEA Director," IRNA (Tehran), 22 July 1997; in FBIS Document FTS19970722001227.

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<sup>xvi</sup> Zahra Ajdari, "Contrary to Western Charges: IAEA has no Reservations About Iran's Nuclear Program," Iran Daily (Tehran), 28 July 1997; in FBIS Document FTS19970802000150.

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<sup>xvii</sup> Abd al-Munim Tawfiq, "Interview with Dr. Muhammad al-Baradii," Al-Quds al-'Arabi (Londo), 12 June 1997; in FBIS Document FTS19970617001352.

<sup>xviii</sup> Communication Received from the Islamic Republic of Iran, INFCIRC/406, 14 July 1992.

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<sup>xix</sup>▲ Olli Okko (ed), *Implementing nuclear non-proliferation in Finland, Regulatory control, international cooperation ,and the Comprehensive Nuclear-Test-Ban Treaty*, Annual report 2012, STUK.

<sup>xx</sup> A. Schlesinger, *A Thousand Days: John F. Kennedy in the White House*, 2<sup>nd</sup> ed., New York: First Mariner Books, p. 897, 2002.

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