International safeguards in nuclear weapon States
Status and look into the future

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Abstract - This paper shall recall the framework for the application of international safeguards in the 5 Nuclear Weapons States and give an overview on their implementation. It shall then discuss some reasons for an evolution of those States and IAEA’s commitments to apply its safeguards and suggests ideas for an increased but efficient involvement of IAEA in those States fully taking into account the specificities of those States within the State Level Approach.

I. INTRODUCTION

International safeguards on nuclear materials were initially devised in the framework of the IAEA statutes in 1956 and under the Euratom Treaty signed in 1957 that is with the early development of the civil application of nuclear energy. However, today general implementation of IAEA safeguards derives from NPT commitments. Under Article 3, all non nuclear weapons States are obligated to accept safeguards on all nuclear materials in all nuclear activities in their territory. One of often made criticism against the non-proliferation regime is that of discrimination in particular regarding the absence of “guarantees” on the civil uses of facilities and materials in NWS. Is this criticism still valid or exaggerated? Does it hold for all weapon States countries? What are the obligations of Nuclear weapon States, what is their situation with regards to the implementation of safeguards? How might or should this situation evolve in the future? These are the questions to be tackled hereunder.

II. SAME STATUS, DIFFERENT OBLIGATIONS AND SITUATIONS WITH REGARDS TO INTERNATIONAL SAFEGUARDS

II.A. Same Status

It is well known and sometimes much criticized, the Non Proliferation Treaty (The Treaty on the Non-Proliferation of Nuclear Weapons also known as the Non-Proliferation Treaty, hereunder referred to as “NPT”) is based on a differentiation of status between Nuclear Weapons States and Non Nuclear Weapons States.

Without going into the historical detail and context it can be said that very pragmatically, the NPT “fathers” tried to achieve a universal Treaty as attractive and balanced as possible to ensure its success. They took into account the situation of States in relation with the possession of nuclear weapons at the time of signature and considered separately the rights and duties of the five nuclear weapons states (the USA, today’s Russia that inherited the status of the USSR, China, United Kingdom, and France).

These 5 States are Parties to the NPT although they did not adhere all at the outset. USA, Russia and UK signed in July 1968 and ratified in 1970 for the first two and in November 1968 for the UK, while France and China only joined the NPT in 1992 and ratified it the same year.

Under the NPT there is no safeguards obligation imposed on Weapon States and none of them had to enter into a safeguards agreement because of their mere adhesion to the NPT. In this respect it is interesting to note the US signed its first safeguards agreement as early as in 1962 to allow IAEA to test its safeguards tools and schemes on 3 research reactors as well as on one power reactor. (1) This agreement was superseded by another agreement in 1964 which was replaced by today’s Voluntary Offer Agreement that entered into force in 1980. it is also interesting to note that both Chinese and French safeguards agreements signed respectively in 1988 and in 1978 well preceded the adhesion of both countries to the NPT (in 1992). UK signed such a Voluntary Offer Agreement in 1973, while Russia entered into such agreement only in 1985.

The 5 NWS are all part of the Nuclear suppliers group, China being the last to join this group in 2005. This group adopted what is known as the “NSG guidelines” that describe the conditions the suppliers countries agree to impose to recipient countries when exporting specifically listed nuclear material and items.

Under the NSG guidelines, no specific safeguards obligations are foreseen for supplying nuclear goods, services or technology to Nuclear Weapon States.
The IAEA statutes which came into force as early as 1957 also preceded any definition of Nuclear Weapons States as opposed to Non Nuclear Weapon States and do not impose any specific safeguards obligation on any States but foresees the means to implement safeguards if this is requested by a Member State.

To summarize, the status of Weapon State stems from the NPT and is reflected in the NSG, while no mention was made for obvious reasons in the IAEA statutes before the NPT came into force but no later amendments to the statutes introduced any distinction between NNWS and NWS.

II.B. Different commitments

Apart of a general political good will, or the wish to set the example, NWS have accepted international safeguards on different grounds. In this respect two situations should be distinguished and clarified if one wants to understand the reality of the implementation of international safeguards in NWS.

1. Bilateral commitments on nuclear material and facilities

1.a. safeguards on nuclear materials

Major uranium suppliers as Australia and Canada that altogether represent 2/3 of the world Uranium supply have adopted as a national policy to subject exports of materials extracted from their mines to conditions and commitments described in intergovernmental agreements.

In this respect, both countries are requiring from all States, including from Nuclear Weapons States, to subject their material to IAEA safeguards.

For instance Australia (2) has concluded a bilateral agreement with the US (1981) and with France (1981) including a peaceful use provision that is to be “verified” through the implementation of the US/IAEA and the France/Euratom/IAEA safeguards agreements.

Australia signed in 1990 a limited scope agreement with Russia to allow for the front end processing (conversion, enrichment and fabrication) for the benefit of third countries’ customers, and imposing placing any remaining material under the IAEA/Russia agreement. Since then, in 2007, they have concluded a regular agreement allowing the use of Australian origin material in facilities included in the Eligible Facilities List and to be agreed upon between both States. Such materials are subject to IAEA safeguards under the Russian /IAEA agreement. However this agreement is pending ratification and as of now, Russia cannot use Australian origin nuclear materials in its power plants.

An Australia/China agreement of the same type as the 2007 agreement with Russia is already in force and allows the transfer of Australian Material into mutually determined facilities and provided the acceptance of IAEA safeguards on the material.

The same policy is being implemented by the US that requires an IAEA safeguards commitment applied through the Voluntary Offer Agreement of other Weapon States. This commitment applies to any uranium mined in the US as well as to any material processed or just used for fabrication purposes on the territory of the US and then exported. Since the US has agreements with all other Weapon States but with Russia, US origin material as of today cannot be transferred to Russia. However an agreement had been negotiated under but frozen by the Bush administration in September 2008 as a consequence of the Russia/Georgia conflict.

This draft agreement called for IAEA safeguards on the material delivered pursuant to the VO Agreement without imposing any restriction as to the facilities of destination.

Apart of Uranium suppliers countries, customer States may be viewed as another category of “suppliers” of nuclear material imposing for instance to have their fuel under IAEA safeguards while being processed in NWS.

This is the case with Japanese or Swiss fuel reprocessed in the UK or France, under specific bilateral agreements.

This situation often results in multi layers of bilateral commitments on the same material. For example if Australian mined Uranium, enriched and used to fabricate fuel in the US, is then used in a Japanese reactor and sent to La Hague to be reprocessed, it will result being subject to France/Australia, and Euratom/Australia, to US/Euratom and to France/Japan and now also to Euratom/Japan agreements that all require this material to be subject to IAEA safeguards.

These few examples illustrate the fact that because of bilateral commitments, NWS have indeed accepted to submit nuclear materials to IAEA safeguards under specific agreements with NNWS suppliers but also with NWS supplier States as with the US. However there are some differences and some agreements may be more limited in scope.

Because of the subject of this paper, it is not intended here to make a full description of the different types of bilateral agreements but it is worth having in mind that some agreements do take full account of the NWS status and, while requiring a peaceful use commitment do not call for any verification mechanism.

1.b. safeguards applied to technology transfers

Under the NPT or the NSG no specific safeguards obligation is to be imposed on NWS in relation with a transfer of technology. However, it is to be noted that, because this was a requirement of the technology transferor, there some examples of NWS having accepted to submit facilities built upon foreign technology to IAEA safeguards and sometimes beyond the commitment to add facilities on the list of their Voluntary Offer Agreement, they are also
committed to actively seek to have IAEA selecting their facility. It is also to be noted that this situation arose in relation with enrichment, that are “sensitive technology” facilities.

The first case involves two NWS, Russia and China in relation with the Shaanxi enrichment plant.

A second case involves two NNWS (Germany and the Netherlands) and a NWS (UK) as the suppliers’ countries and a NWS (France) as the recipient. Resulting from those four Euratom States requirement, France has actively pleaded for the designation by IAEA of its new George Besse 2 centrifuge enrichment plant at Tricastin.

A third example will concern in the future, the enrichment plants under construction or to be built in the US on the former URENCO and now ETC centrifuge technology. A requirement to submit these future facilities to IAEA safeguards is contained in the so called “Washington Treaty” between the UK, Germany, the Netherlands and the US and shall be reproduced in the Agreement to be negotiated between those countryplus France.

2. Multilateral commitments

The two European States, historically first France and the UK belong to the European Community for Atomic Energy through a Treaty that entered into force in 1958 and that is legally binding upon its members and enforced through a number of secondary legally binding texts, called Directives and Regulations. While Directives set the objectives to be attained by all Members States on different matters, -leaving to each member state the choice of the tools to achieve the goal- European regulations are of direct application.

Chapter seven of the Euratom Treaty is entitled “contrôle de sécurité” or “safeguards” and provides for the verification by Euratom and its inspectors, of the appropriate use and location of all nuclear materials that are declared to be devoted to “peaceful uses”. In addition the Euratom controls are to check that obligations subscribed under supply agreement between Euratom and a supplier State are respected. Since Euratom has entered into bilateral supply agreements, it has agreed for instance to have Canadian, Australian or US origin material subject to IAEA safeguards, irrespective of the European country where the material is to be transferred, be it a NNWS or one of the two European Weapons States.

Hence, according to the Euratom Treaty and the safeguards regulation, which has been revised in 2005, all peaceful nuclear activities are under strict Euratom control in all civil facilities on the EU territory.

The implementation of Euratom safeguards has developed and evolved in parallel with the IAEA safeguards, using the same basic principles, methods and equipments.

Altogether in UK and France the inspection effort of Euratom was larger than in all NNWS of the EU.

III. SAFEGUARDS IMPLEMENTATION

The implementation of safeguards in the NWS is very different in scope and application, with the two European States being de facto under international safeguards for all their civil activities while no IAEA routine inspections is today being implemented in Russia.

III.A. Voluntary Offers Agreements

Absent of general safeguards requirements stemming from their membership of the NPT, the 5 NWS countries have concluded what is called “Voluntary Offer Agreements” with IAEA.

The US signed its first safeguards agreement in 1962 that was replaced by INFCIRC 57 in 1964 and then by the VOA that was signed in November 1977, entered into force in December 1980, and published as INFCIRC 288.

The first UK safeguards agreement signed in 1973 was replaced by the trilateral agreement, including Euratom upon UK’s membership to the EU. Signed in 1976 this agreement was published as INFCIRC 263 and entered into force in August 1978.

The other trilateral agreement involving IAEA, France and Euratom was signed in July 1978 and entered into force in September 1981 (INFCIRC 290).

Russia, at that time the USSR did not rely on any imports of nuclear material for a long period of time and only signed its VOA in February 1985. This Agreement was entered into force in June of the same year (INFCIRC 327).

Lastly, China’s VOA was signed in September 1988 and entered into force in September 1989 (INFCIRC 369).

All five NWS have also concluded Additional Protocols that are by nature different from those of NNWS, but whereby NWS accept to give additional information and access to IAEA.

These Voluntary Offer Agreements are based on similar structure and principles but are different in their implementation.

Basically, the VOAs reflect INFCIRC 153 model. A first part describes the scope and recalls the general approach and main principles, while the second part describes in some details the procedures to be followed. In addition “Subsidiary arrangements” (that are not published) go into more implementation details, rights and duties. By contrast with the NNWS, the VOAs apply to a list of facilities that is the sole responsibility of the NWS to propose, and that can be changed at its will, of course in relation with its other bilateral commitments as seen above.
Likewise, once IAEA receives the list of “eligible facilities” that are offered to be safeguarded; it is IAEA’s responsibility to select such and such facility (or none). No bilateral agreement involving a NWS may be binding on IAEA to effectively implement verification activities in such or such facility.

The same language about the procedures to be followed by IAEA is used in the Russian and in US VOAs. It is indicated that those procedures should be the same as those applied on similar material and similar facilities in NNWS. If the term “procedure” is to be understood as including quantity and timeliness goals, this could seem to somehow restrict the possibility for IAEA to adopt a State level approach for those two States. By contrast, in the Chinese and in both European NWS trilateral Agreements, there is no such provisions and IAEA should in principle have more flexibility in the way it may implement its safeguards. However this legal nuance has had no real impact up to now.

Independent from the selection of specific facilities, the VOAs provide for the transmission of accountancy information on materials subject to IAEA safeguards.

In the case of France and UK this information encompasses both the global inventory of materials to be subject to IAEA safeguards and, transferred by Euratom, very detailed accountancy reports of materials in some facilities (today 15 in France).

The facilities under IAEA inspection as published on the IAEA website are:
China; Quin Shan (power plant) Nankou HTGR (research) and Shanxi (enrichment)
UK; Urenco Capenhurst (enrichment), Sellafield, Thorp (storage facilities)
US; (Savannah River, Hanford, Oak Ridge (plutonium storage offered as excess weapons materials facilities), BWXT, Lynchburg down blending HEU facility (other facilities).
France; UP2, UP3 la Hague (Plutonium storage).
NB; although not in this list the Melox fabrication plant is also subject to inspections in relation with the export of MOX fuels to NNWS.
Russia is not mentioned since no Russian facility has been selected by IAEA for its regular inspection activities.

III.B. Practical implementation

As far as the implementation of safeguards in the selected facilities is concerned the same principles, tools and methods as in NNWS are used.

The basic dogma is that IAEA must draw its independent safeguards conclusions; it makes use of the usual array of measures, although making some use of other existing information and to some extent, of Euratom safeguards. Among those measures may be mentioned, verification and regular re-verification of the design information of the facilities, confinement and surveillance systems by means of cameras, detectors and seals, sampling and analysis of material, some environmental sampling, and physical inventories. All these measures are being based on a stringent accountancy control.

In some States like in France the accountancy related to the materials in the list of all eligible facilities is transferred while in the US for instance, the accountancy reports are transmitted only in relation with materials in facilities designated for IAEA inspections.

IV. EVOLUTION OF SAFEGUARDS IN NWS, IN THE 21 CENTURY

The nuclear safeguards system has evolved in the past to respond to the evolution of technology but also to respond to the need of a global non proliferation regime that reacted and still has to adapt to new challenges and critical situations. In this broader context, some reflections and proposals are described hereunder to promote a more balanced but pragmatic approach to implementing International safeguards in NWS in the 21st century.

IV.A. Safeguarding civil sensitive facilities (enrichment and reprocessing)

IAEA should not refuse to apply an effective and efficient system to the sensitive facilities that would be offered to safeguards in NWS.

A series of meetings launched in 2004 under the leadership of Bruno Pellaud was devoted to International approaches to the nuclear fuel cycle, which resulted in a document reflecting the views of IAEA in favour of Multi National Approaches to the nuclear fuel cycle, often referred to as MNA. A parallel reflection was led by the US and gave birth in 2006 to the Global Nuclear Energy Partnership (GNEP) initiative that was launched under the Bush administration.

Whatever the fate of these proposals or names, what is important is the gradual and today rather large consensus about the fact that it makes sense from a non proliferation point of view, to try and limit worldwide, on a voluntary basis, the number of sensitive facilities such as enrichment and reprocessing facilities.

Without entering into too long a debate, and although such existing facilities can be properly safeguarded on a technical ground, the fewer the number of new countries do develop such facilities, and the less risk you take that such countries might break out from all their non proliferation commitments. In addition, avoiding the deployment of too many such facilities in new NNWS would allow for a better allocation of scarce IAEA resources.

This limitation principle can only be adopted by countries developing nuclear energy together with very strong
commitments from the suppliers as to the assurance of supply. In addition, it would be legitimate for those countries to rely on an international verification mechanism ensuring that their materials are not contributing to the possible increase of weapons in such NWS (vertical proliferation).

Hence, as a complement to its MNA proposal, IAEA should be tasked to implement, in perpetuity, safeguards in sensitive facilities operating in NWS but with the participation or for the benefit (service) of NNWS.

How would this be handled?
Legally, since the VOAs leave to the NWS the possibility to add or withdraw any facility from the list of facilities offered to safeguards, it is likely that either an amendment to the safeguards agreement or a complementary offer agreement to put such facilities in perpetuity under IAEA safeguards would be needed.

For legitimate budgetary reasons and considering the perspective of a nuclear expansion worldwide, IAEA is currently reluctant to select for inspection, any new facility in the NWS. The selection of the new French enrichment plant (George Besse 2 plant) that should be soon decided has needed a long discussion process and the resulting delay may be prejudicial to the overall efficiency of the safeguards scheme. This situation should not be duplicated in the future. IAEA should have no choice but to select such sensitive facility.

This could be reflected in the aforementioned complementary agreement or protocol. Alternately, a generic resolution of the Board of Governors applying to Multinational fuel cycle facilities, should impose IAEA’s conduct.

Who would pay?
The IAEA regular budget should be increased to take into account such new task.

It would be completely abnormal, or discriminatory if only NWS and, worst, nuclear industry in NWS would suffer the cost of IAEA safeguards efforts. Indeed this scheme would be in the benefit of all, avoiding to spend even more resources to safeguard new facilities in new countries. In addition it would go in the direction of many countries’ call for a “non discriminatory” regime.

IV.B. Differentiation is no discrimination

A specific State level approach should be developed to apply IAEA safeguards in NWS. This would pave the way for a verifiable cut off Treaty that is regularly debated before NPT review conferences. This of course should equally apply to any such sensitive facility in non NPT State.

In relation with the above proposal, but also integrating the evolution of the safeguards approach to NNWS, a Specific State approach regarding NWS should be devised.

In short, the idea here would be to recognize that there would be no purpose for NWS that are “allowed” to produce nuclear material for their military program, to try and divert small or large quantities of materials that would not be equivalent in quality to what they have been using to build up their arsenals and stocks of materials.

Although it might be of interest for a NNWS to try and proliferate with nuclear explosive devices with relatively limited impact and no reliability, the diversion of certain materials usable for “weapon or explosive devices” as opposed to direct weapon use material would be objectively of low gain and would constitute a high risk strategy for the NWS. Ultimately, it would be of a negligible practical significance. Hence the objective of safeguarding the sensitive facilities in NWS would be to verify that the facilities as such are not used to produce direct weapon use material. This would mean in practice that the objective of the verification for an enrichment plant would be to confirm that there is no enrichment of Uranium above a 20% U235 level. As far as reprocessing is concerned, the objective should be to verify that only high burn up fuel is being processed in the plant. Indeed, plutonium contained in high burn up fuels is unfit to contribute to a vertical proliferation effort that is, to be used to increase the number of nuclear weapons comparable to those weapons held by NWS).

This would not prevent integrating measurement devices or providing for a close follow up of the material in case low burn up fuel would have to be processed.

In other words this path would mean taking into consideration an attractiveness criteria, adapted to NWS, in the proliferation scenario. Making full use of the State level approach applied to NWS could be adopted smoothly avoiding changing some wordings in the present VOAs. (Ex, art 3c of INCIRC 288).

IV.C. Making full use of EURATOM safeguards

This point is of a more general nature but is worth discussing in the context of this paper since 2 out of the 5 NWS are concerned. This may have an important and positive impact on the issue of resources.

As mentioned earlier, IAEA as well as Euratom consider that they have to draw their independent safeguards conclusions.

Fortunately there is some cooperation between both organisms where they both inspect but a more integrated approach could be devised. For instance, were the proposals above to be adopted as confidence building measures, the safeguards activities led by Euratom could be verified and quality controlled by the Agency, and serve as part of the IAEA safeguards activities in NWS. Since Euratom carries out its safeguards activities in all civil facilities of both European NWS, with similar tools and approaches as the IAEA does, IAEA could reduce its efforts and costs, by
checking Euratom’s activities and even devising the safeguards plan with Euratom, while preserving its legal rights to intervene without previous notification (short notice or unannounced inspections) in any facility on the list of “eligible facilities”.

CONCLUSION

As in all other industrial sectors, nuclear energy has developed thanks to an increased interdependency between the different nations of the world. The non proliferation regime and safeguards systems have undergone profound adaptations. Nuclear Weapon States have progressively accepted from their suppliers or from their customers and have imposed even to their peers not only peaceful uses commitments but also safeguards obligations. Today in the perspective of a further expansion of nuclear energy, there is a broad consensus on the benefit on non proliferation grounds, of a limitation of the number of countries with sensitive nuclear facilities. The acceptance of this approach will be facilitated if NWS that host most of these facilities would accept international safeguards and if IAEA would indeed perform its activities in such facilities that should be subject to safeguards in perpetuity. This move will entail additional costs to the Agency and to the IAEA community but those costs could be reduced through a better definition of the scope of the safeguards, applying a State level approach, and thanks to a less dogmatic approach towards regional, and in particular Euratom safeguards.

Revisiting the issue of safeguards in NWS in a pragmatic spirit, appears to be very timely as part of a new reflection on the role of IAEA, and in the context of a recommended globalization of nuclear industry but also in the perspective of the political discussions over an FMCT and of the next NPT review conference.

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