



EXPANDING SAFEGUARDS IN NUCLEAR-WEAPON STATES

John Carlson
Counselor, Nuclear Threat Initiative

This paper is a further development of a presentation to the Annual Meeting of the Institute of Nuclear Materials Management, Palm Desert, California, 17-21 July 2011

EXECUTIVE SUMMARY

Currently there is limited application of safeguards in nuclear-weapon states (NWS), other than EURATOM safeguards which apply to all civilian facilities in the UK and France. Historically the priority for IAEA safeguards has been to address *horizontal* proliferation, i.e., the acquisition of nuclear weapons by non-nuclear-weapon states (NNWS). The NWS have *voluntary offer agreements* under which they may designate material and facilities for safeguards. The IAEA selects for inspection only a small number of the facilities so designated.

As nuclear disarmament progresses further, it will be necessary to extend the application of safeguards—or equivalent verification—in NWS. For example, the proposed fissile material cut-off treaty (FMCT) will require, as a minimum, verification that: (i) further fissile material produced is not used for nuclear weapons; and (ii) there is no undeclared production of fissile material. This will require safeguards on enrichment and reprocessing facilities and downstream fissile material flows, as well as measures to detect any undeclared enrichment and reprocessing facilities.

The objective of nuclear disarmament is that ultimately there will be no NWS, all states will have similar nuclear status (i.e., they will be NNWS) and similar safeguards obligations.

One approach to extending safeguards in NWS is to wait until this is required by new agreements such as the FMCT. However, extending safeguards more proactively would help build the confidence, transparency and trust required in support of further disarmament steps, enabling earlier progress. The IAEA would benefit through the larger resource base required, which would strengthen its expertise and its capacity to deal with unexpected safeguards demands.

More extensive safeguards in NWS would involve significant costs, but these could be contained through development of State Level Approaches, and possibly through further regional safeguards arrangements such as EURATOM.

1. INTRODUCTION

The current IAEA safeguards system is based primarily on the Nuclear Non-Proliferation Treaty (NPT). Under this Treaty, non-nuclear-weapon states (NNWS) accept IAEA safeguards on all

their nuclear material to verify non-diversion to nuclear weapons. The nuclear-weapon states (NWS)¹ however have no obligation to accept safeguards—historically it was considered that application of safeguards to all civilian facilities in NWS would be too expensive.

Underlying this is the historical view that the principal purpose of the NPT – and the priority for IAEA safeguards—is preventing horizontal proliferation, the acquisition of nuclear weapons by additional states (i.e., NNWS). Addressing vertical proliferation—increases to the arsenals of the NWS—was seen as a matter for further negotiation, pursuant to the NPT’s disarmament provisions.²

During the negotiation of the NPT, some NNWS raised the concern that their nuclear industries would be disadvantaged commercially, relative to those of the NWS, through the latter being outside safeguards. These NNWS argued that safeguards would impose a cost burden on them, and also present a risk of industrial espionage. The U.S. and UK responded that they were prepared to accept the same safeguards as the NNWS, excluding only nuclear activities of national security significance.

Following the NPT’s entry into force in 1970, attention turned to the negotiation of a standard IAEA safeguards agreement, resulting in IAEA document INFCIRC/153. This was to apply to NNWS but could be adapted for use by NWS. In the latter case, the agreement did not apply to all nuclear material and activities – since clearly the NWS had military programs which would remain outside safeguards – but only to those materials and activities designated by each NWS as being eligible for the application of safeguards if selected by the IAEA. These agreements became known as *voluntary offer agreements* (VOAs). The first such agreements were concluded by the UK, with the IAEA and EURATOM, in 1978, and by the U.S. in 1980 with the IAEA. France concluded a VOA with the IAEA and EURATOM in 1981; the Soviet Union concluded a VOA with the IAEA in 1985, and China in 1988.

The U.S. and UK eligible facility lists encompass all the civilian facilities in these states. The French eligible facility list includes only those facilities containing nuclear material to which third parties (e.g., supplier states and Japan) require safeguards to apply. However, Erratum safeguards apply to all civilian facilities in France (and the UK). The Russian and Chinese voluntary offers have been more limited: in the case of Russia, essentially including facilities of a type where IAEA inspectors would benefit by gaining safeguards experience (such as fast reactors, fuel fabrication); in the case of China, including facilities at the request of the relevant supplier state. Bilateral safeguards agreements may also be relevant, e.g., Australia’s nuclear agreements with Russia and China require facilities using *obligated* nuclear material to be included in the IAEA eligible facility list.

It is evident from statements made as the various NWS concluded their VOAs that the main purpose, from their perspective, was to promote universal acceptance of the NPT, and universal application of IAEA safeguards to all nuclear programs in NNWS. It was recognized that the funding and human resources available to the IAEA did not permit full scale application of IAEA safeguards to all civilian facilities in the NWS. So ideas on prioritizing safeguards effort were

1. The NPT recognizes five NWS, i.e., US, Russia, UK, France and China.

2. NPT Article VI.

developed, the principal one being to undertake inspections where this was a direct benefit to the IAEA – see points (b) and (c) in the following section.

Initially it was suggested that the IAEA’s safeguards effort in the NWS should equate to around 20% to 30% of its total safeguards effort. In practice the IAEA has never had the level of funding to reach these levels. Current IAEA safeguards in the NWS are around 5% of the total safeguards effort.

2. IAEA SAFEGUARDS IN NWS TODAY

Currently there is no over-arching policy rationale for the application of safeguards in NWS. The IAEA selects from the VOA eligible facility lists only those facilities where:

- (a) An NWS has an agreement requiring particular nuclear material or facilities to be inspected;
- (b) Inspectors benefit through gaining experience with a particular type of facility; or
- (c) It helps safeguards implementation in an NNWS (e.g., where nuclear material is being transferred to or received from a NNWS).

There are some agreements for applying safeguards in NWS in specific situations. For example, the IAEA applies safeguards in the U.S.: (i) to nuclear material declared as excess to defence needs; and (ii) on down-blending of Russian ex-military HEU to LEU for civilian use (this is at Russia’s request, to confirm that the material is in fact down-blended).

Another longstanding example is the Hexapartite arrangement for commercial gas centrifuge enrichment plants, involving Australia, Germany, Japan, Netherlands, UK and U.S. The primary motivation for this arrangement was to avoid perceived unfair commercial advantage to the NWS parties (UK and U.S.), relative to the other parties, from the absence of safeguards on their enrichment facilities. In practice the U.S. commercial centrifuge plant envisaged at that time did not proceed, and the UK was in any case covered by Euratom safeguards, so the perceived advantage to the NWS did not eventuate.

More recently, the IAEA applies safeguards to a Russian-supplied centrifuge plant in China, at Russia’s request. Urenco has supplied centrifuge plants to U.S. and France on condition they are eligible for IAEA safeguards. Likewise, Australia has required that facilities built in the U.S. using Silex laser enrichment technology are to be eligible for IAEA safeguards. Mention might also be made of the International Uranium Enrichment Centre at Angarsk (Siberia), where the IAEA is applying safeguards to part of the facility at Russia’s request. Finally, as already noted, Euratom safeguards—which have similar procedures to IAEA safeguards—have been applied at all French and UK civilian facilities for decades.

3. SAFEGUARDS IN THE NON-NPT NUCLEAR-ARMED STATES

This paper mainly addresses issues relating to the recognised NWS, because of the scale of their nuclear programs and because of the attention given to this subject in the NPT context. It is clear

however that similar issues arise in the case of the non-NPT states, India, Israel³ and Pakistan (and possibly also the DPRK).⁴

Currently, safeguards are implemented at a (small) number of facilities in India, Israel and Pakistan under *item-specific* safeguards agreements (based on the INFCIRC/66 model). Historically, particular facilities have usually been made subject to INFCIRC/66 agreements at the behest of the relevant supplier state. In 2008 India concluded a more extensive INFCIRC/66 agreement, which is to apply to 14 out of 22 civilian reactors and associated facilities, and which provides for additional facilities to be added by India in the future.

4. INCREASING THE SAFEGUARDS COVERAGE IN NWS

In addition to points (a) to (c) in section 2 above, there are important policy reasons for extending the safeguards coverage in NWS, namely:

- a) To demonstrate equality of commitment to the principles of the NPT. This essentially political argument has gained considerable support at successive NPT Review Conferences;
- b) As nuclear disarmament proceeds, the progressive widening of safeguards and other verification measures will be essential to this process.

This last point provides a strong over-arching rationale for increasing safeguards coverage in NWS, and also the non-NPT states with nuclear weapons. The goal at the end of the disarmament process is that ultimately there will be no NWS; all states will have the same safeguards status. To achieve this will require the non-NPT states to also be part of the disarmament process and to make the same commitments as the NWS recognized under the NPT.

The main practical factor in extending safeguards is the IAEA's limited budget. Recognition of resource constraints is reflected in the Final Document of the 2010 NPT Review Conference, which called for:

“... the wider application of safeguards to peaceful nuclear facilities in the nuclear-weapon States ... in the most economic and practical way possible, taking into account the availability of the IAEA resources and stresses that comprehensive safeguards and additional protocols should be universally applied once the complete elimination of nuclear weapons has been achieved.”⁵

There is no question that the wider application of safeguards in NWS will require a substantial increase to the IAEA's safeguards budget. However, historical cost estimates (which suggested the need for a 2 to 3-fold or even a 4-fold increase) no longer apply. Such estimates reflected the facility-based approach under traditional safeguards, where safeguards effort was a product of the number of facilities and the quantities of material. In contrast, today the State Level Approach, emphasising information analysis, is used to determine the necessary safeguards effort.

3. Israel neither confirms nor denies its nuclear-armed status.

4. The DPRK announced withdrawal from the NPT in 2003 but the validity of its withdrawal has not been determined.

5. 2010 NPTRC Final Document, Action 30.

States must be prepared to increase the safeguards budget. While nuclear disarmament will benefit all states, the NWS and the non-NPT states will be particular beneficiaries—these states should recognise the value of increased safeguards in supporting disarmament.

The other required action is for the NWS to ensure that all civilian facilities are designated under their VOAs.

5. SAFEGUARDS APPROACHES FOR NWS AND NON-NPT STATES

In increasing the application of safeguards in NWS, it is necessary to define the safeguards objective in each case. All the NWS ceased production of fissile material for nuclear weapons many years ago. The U.S. and Russia in particular have very large surpluses of fissile material which they have been transferring to civilian use. In these circumstances there is no incentive for NWS to divert nuclear material from civilian to military programs, so there is not currently a strong imperative to apply safeguards in the NWS to counter possible diversion. However, this situation will change as disarmament progresses. As each state's arsenal and unsafeguarded fissile stocks shrink, the potential motivation to divert will change, and this should be reflected in the safeguards strategy.

These considerations are consistent with the IAEA's evolving practice of applying safeguards on the basis of a State Level Approach. This involves developing a safeguards strategy that takes account of the particular factors relevant to each state—the characteristics of the state's civilian nuclear program (for NWS, it will also be necessary to consider the known characteristics of the military program, and possible cross-over points from civilian to military), known and potential acquisition paths, the safeguards-relevant information available for the state, and so on.

Similar considerations apply with the non-NPT states. With INFCIRC/66 agreements, once nuclear material is subject to safeguards it retains this status (subject to substitution provisions), and safeguards will apply in downstream facilities as necessary. However, as safeguards coverage in the non-NPT states increases in the future, the IAEA will need to ensure both effectiveness and efficiency by developing State Level Approaches for these states.

6. PREPARING FOR THE FUTURE

Extending the application of safeguards in NWS in the near term might not be fully effective in the context of the overall fuel cycle (which will largely remain unsafeguarded for the time being), but will have the benefit of getting the NWS used to facilitating safeguards inspections on a wider scale than they do now. As has been discussed, far wider safeguards coverage will be required in these states in the future.

As part of preparing for the wider application of safeguards in NWS, the decision should be taken now to employ *safeguards by design*, i.e., enrichment and other sensitive facilities in NWS should be designed to facilitate the application of safeguards in the future. This should also be done with the non-NPT states.

The obvious need for safeguards in NWS, and also the non-NPT states, will come with the development of a fissile material cut-off treaty (FMCT) or a broader fissile material convention. For FMCT purposes, the safeguards objectives would be:

- a) To verify that fissile material produced after the FMCT's entry into force is used only for non-proscribed purposes; and
- b) To provide assurance that all fissile production takes place under verification, and there is no undeclared fissile production.

In addition, a mechanism is likely to be needed by which NWS can progressively and irreversibly place surplus fissile material stocks under safeguards. In the case of the other nuclear-armed states, INFCIRC/66 agreements already provide for safeguards irreversibility—these states should use this mechanism to progressively place stocks under safeguards.

The next step would be for the IAEA to progressively implement safeguards at these facilities—this will require development of safeguards approaches for old facilities that were not designed with safeguards in mind, and also to increase the IAEA's resources commensurately. The safeguards objectives would be those proposed for the FMCT, as outlined above.

Once the FMCT is settled, the next major verification task will be to cover previously unsafeguarded nuclear material—surplus stocks and material arising from nuclear weapon dismantlement—that will be brought progressively and irreversibly under safeguards. And, as noted above, State Level Approaches will require adjustment for changing risk assessments as the numbers of nuclear weapons are reduced. The application of safeguards in NWS and NNWS will converge.

Ultimately, as the Final Document of the 2010 NPT Review Conference points out, safeguards will become universal and there will be no basis for those states currently designated as NWS to retain this status. However, as noted earlier, it will be essential for the non-NPT states to also be part of the process and to accept the same commitments.

There is a great deal to be resolved along the way, e.g.:

- (a) Whether safeguards continue to be implemented by the IAEA alone, or whether further regional arrangements will be established (perhaps with the IAEA setting standards and auditing performance);
- (b) The development of transparency arrangements and confidence-building measures to complement safeguards;

The current situation of most nuclear activities in the NWS being outside safeguards will not continue indefinitely. The NWS should be thinking constructively about moving to safeguarded nuclear programs—how to ensure the necessary safeguards effectiveness and cost-efficiency and how to ensure safeguards agencies (the IAEA and national authorities) have the necessary funding and skilled people.

Expanding the work of the IAEA to do more in the NWS will bring significant benefits, including widening the Agency's resource base and expertise. A larger staff will provide the IAEA with greater flexibility to absorb unexpected workloads, e.g. as problem cases emerge.

7. CONCLUSIONS

In considering the wider application of safeguards in NWS—and also the non-NPT states—the key question is: how do we best progress towards a situation of substantially reduced numbers of nuclear weapons and ultimately to their elimination? Rather than safeguards just keeping pace

with evolving agreements, safeguards could be used to prepare the ground, helping to build the confidence and transparency needed to support political commitment to take disarmament further. There are clear advantages in such a proactive approach, namely to encourage faster progress towards low numbers and elimination. But to do this, states must be prepared to provide the necessary resources for safeguards, both for the IAEA and at the national level.

John Carlson is counselor to the Nuclear Threat Initiative, www.nti.org. He served as Australia's Sherpa for the 2010 Nuclear Security Summit. More recently, he was a member of the International Panel of Experts for the NTI Index.