

NUCLEAR WEAPONISATION ACTIVITIES: WHAT IS THE ROLE OF IAEA SAFEGUARDS?

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Abstract

An issue receiving increasing attention in light of recent cases is the role of IAEA safeguards with respect to nuclear weaponisation activities. IAEA safeguards agreements are written in terms of nuclear material. The manufacture of nuclear weapons obviously requires nuclear material, but many preparatory activities do not directly involve nuclear material. Some relevant non-nuclear materials and activities are “dual-use”, i.e. taken in isolation they do not necessarily indicate a clear intention to manufacture a nuclear weapon.

The NPT requires non-nuclear-weapon states to accept safeguards for verifying obligations under the Treaty “with a view to preventing diversion of nuclear energy from peaceful purposes to nuclear weapons”. The reference to prevention indicates that safeguards should act to pre-empt diversion, not wait until diversion has taken place. Although safeguards agreements establish procedures applying to nuclear material, the additional protocol recognises that information on certain items and non-nuclear materials can assist in drawing conclusions about nuclear material.

This paper discusses issues such as: the IAEA’s legal authority as regards weaponisation activities; the IAEA’s detection capabilities for such activities; and how the IAEA should deal with indications of weaponisation. Also discussed is the important issue of appropriate handling of sensitive information, such as weapon design information or components in classified form.

1. INTRODUCTION

This paper deals with the case of non-nuclear-weapon states (NNWS) party to the NPT, which have concluded comprehensive safeguards agreements with the IAEA based on INFCIRC/153, and hopefully also an additional protocol (INFCIRC/540) (at the time of writing, 102 NNWS have concluded or signed an additional protocol).

“Weaponisation” is a shorthand term for the range of activities, other than acquisition of fissile material, necessary for the manufacture of a nuclear weapon or nuclear explosive device. The manufacture of nuclear weapons obviously requires nuclear material, but many preparatory activities do not directly involve nuclear material. Some relevant non-nuclear materials and activities are “dual-use”, i.e. taken in isolation they do not necessarily indicate an intention to manufacture a nuclear weapon. While a single activity may be ambiguous, however, a combination of such activities may be less so. Another factor to be taken into account in assessing the significance of possible weaponisation activities is whether the state is known to have, or be developing, nuclear-capable delivery systems.

Whether the state is known to have direct-use material, or the capability to produce this, is an essential aspect of assessing the significance of apparent weaponisation activities – but it should not be overlooked that weaponisation activities may themselves be an indicator for the existence of undeclared nuclear material/activities.

Weaponisation activities include weapon design, associated computer simulations, modelling and calculations, activities involving high-explosive lenses, high-energy electrical components, high-flux neutron generators, and implosion testing¹. They also include conversion of fissile material into metallic form, and casting and machining fissile material into the shapes required for a weapon. And they can include acquisition of certain non-nuclear materials, such as beryllium, polonium, tritium and gallium.

Some of these activities directly involve nuclear material: obvious examples are implosion testing with nuclear targets, and shaping of nuclear material into weapon components. Perhaps a less obvious example is production of non-nuclear materials such as polonium-210 and tritium, which requires use of nuclear material for irradiating target materials. Other activities need not directly involve nuclear material, and may be dual-use in nature. Examples include implosion experiments using non-nuclear targets, acquisition of particular types of high-energy electrical circuits, and acquisition of high-speed cameras. Some, but not all, of these involve items on the NSG dual-use list. And while conversion of nuclear material into metallic form, and acquisition of the kind of non-nuclear materials mentioned, may evidence nuclear weapon intent, these too can be dual-use activities.

The IAEA Secretariat has suggested that “absent some nexus to nuclear material the Agency’s legal authority to pursue the verification of possible nuclear weapons related activity is limited”². What is a sufficient nexus? It seems clear that high-explosive testing using nuclear material would be a sufficient nexus. It might be argued that high-explosive testing using non-nuclear material might not be a sufficient nexus – though this is a judgment that should depend on all the relevant circumstances.

Clearly, development of nuclear weapons must at some stage involve nuclear material. The conduct of certain activities by a state may be a clear indication of intent to misuse nuclear material – and may indicate the existence of as yet undetected nuclear material/activities. The IAEA has a responsibility to provide timely warning of diversion of nuclear material to nuclear weapons, so cannot ignore activities that indicate preparation for diversion, or indeed that diversion has already occurred but not been detected³.

In considering the IAEA’s rights and responsibilities in this area, it is important to distinguish between:

- the IAEA’s legal **authority** – its right of access to locations in a state to investigate possible weaponisation activities, and its responsibility to draw conclusions;
- the IAEA’s **detection capabilities** - detection of some of these activities could be very difficult. This should not be confused with the **right** to investigate, but it can affect the level of assurance the IAEA is able to provide.

2. THE IAEA’S AUTHORITY

The subject of weaponisation raises fundamental issues regarding the IAEA’s safeguards mission. At a formal level, it might be argued that the IAEA’s authority with respect to a particular state is defined by its safeguards agreement with the state. An INFCIRC/153 agreement sets out safeguards procedures

1. Some of these activities are unique to implosion designs. The possibility of weaponisation based on a gun-assembly should not be excluded.

2. IAEA report of 27 February 2006 on “Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran”, IAEA document GOV/2006/15, paragraph 52.

3. The term “diversion” can apply both to removal of nuclear material from safeguards, and to failure to declare nuclear material.

applying to **nuclear material**. Accordingly, some argue, the IAEA's verification activities are limited to nuclear material. A further issue is whether the IAEA can reach findings on **anticipated** diversion of nuclear material, or can only do so after the fact, i.e. if it finds diversion has already occurred.

In addressing these issues, it is not in the interest of effective safeguards to construe INFCIRC/153 too narrowly. The relationship between a state and the IAEA is defined at a number of levels, not only by the safeguards agreement, but by the NPT and - for the overwhelming majority of states that are IAEA Member States - by the IAEA's Statute.

The safeguards mission as envisaged by the NPT – or more particularly, by the parties to the NPT - is set out rather broadly. Each NNWS undertakes not to receive, manufacture or acquire nuclear weapons (Article II). Each NNWS also undertakes to accept safeguards for the purpose of **verifying fulfilment of their obligations** under the Treaty. These safeguards are to be set forth in an agreement in accordance with the Statute and the **Agency's safeguards system**, with a view to **preventing** diversion of nuclear **energy** from peaceful purposes to nuclear weapons (Article III.1).

The NPT goes on to specify that safeguards procedures are to apply to all nuclear material in the state. In view of the preceding broad expression of purpose, this reference to nuclear material can be seen, not as limiting safeguards to nuclear material, but rather, as reflecting (a) that nuclear weapons require nuclear material, and (b) the prevailing view at the time the NPT was negotiated that the Treaty objectives could be met through verifying **declared** nuclear material and facilities.

NPT obligations are not limited to nuclear material. The NPT prohibits acquisition of **nuclear weapons** – which would encompass activities necessary to manufacture nuclear weapons, i.e. weaponisation activities. Further, the NPT is couched in terms of diversion of **nuclear energy**, which is somewhat broader than nuclear material. And the underlying purpose of safeguards is stated to be **prevention** of diversion. Since safeguards as such cannot *prevent* diversion, the meaning of this must be that the IAEA should try to warn the international community in time to intervene before the diversion is effected. Thus the language of the NPT indicates that the IAEA's verification responsibilities are not limited to nuclear material, and that it should be forward-looking, i.e. it can, and should, provide warning where it finds indications of **intended** diversion.

INFCIRC/153 is written in narrower terms than the NPT, setting out safeguards procedures to be applied to nuclear material. But INFCIRC/153 does not represent the full extent of the IAEA's verification mandate. Under the NPT, the state has accepted “the Agency's safeguards system”. This is an evolutionary system, a system whose content is under continuing development – as shown by the fact that when the NPT was concluded INFCIRC/153 did not exist, states accepted a commitment to a system that was then undefined. To find major elements of the safeguards system it is necessary to go outside INFCIRC/153 – upwards, to decisions of the Board of Governors, and downwards, to the IAEA's Safeguards Manuals, Safeguards Criteria, the integrated safeguards conceptual framework and associated documentation, and so on. The point is, there is considerable flexibility in “the Agency's safeguards system”, within reason the system is what the IAEA's Board and Secretariat choose to make it.

Recognition that, in order to make the safeguards system more effective, the IAEA's verification authority needs to go beyond nuclear material, can be found in the additional protocol (AP), INFCIRC/540. The AP has extended the IAEA's authority into a number of areas where nuclear material would not normally be present, such as manufacture of centrifuge components, heavy water, nuclear grade graphite, and shielded flasks, and construction of hot cells. The rationale for this is clear

– information on these activities strengthens the IAEA’s ability to verify and draw conclusions on nuclear material in the state concerned. A similar rationale applies to weaponisation activities.

There is no question that, for a NNWS, weaponisation activities are prohibited by the NPT. There should be no question that the IAEA’s mandate extends into this area, since at some point weaponisation necessarily requires diversion, be it declared or undeclared nuclear material. The only room for argument would appear to be in situations where (as far as known) no nuclear material is involved, and the state maintains the activity has nothing to do with nuclear weapons. This situation involves two issues – the IAEA’s right to investigate, and its ability to draw conclusions.

For an activity of a kind that *could* involve nuclear material, the IAEA should be able to investigate, as otherwise it will not be able to confirm (or otherwise) the state’s assertion that no nuclear material is involved. If inspectors find no nuclear material, however, they may still consider that the activity has not been satisfactorily resolved. If the activity by its nature would *not* involve nuclear material, it still may be of a kind that should be investigated. An example would be experiments with neutron generating systems, where inspectors could conclude that the work is for a nuclear application. On the other hand, it may be impractical to attempt to investigate computer modelling activities.

Returning to the issue of “anticipated diversion”, a common view is that the IAEA cannot consider “intent” but must limit itself to facts. This overlooks that indicators are not speculative, but are themselves factual in nature. If a state is found to be conducting certain activities, that is a matter of fact. Thus drawing a conclusion about a state’s intent is not a matter of speculation, but of inference from known facts. The only difference with the kind of inference more commonly drawn in safeguards is that the conclusion may be less definitive. Nonetheless, since the purpose of safeguards, as envisioned in the NPT, is to **prevent** diversion, the IAEA’s duty to NPT parties is, where possible, to give warning before, not after, the horse has bolted.

3. THE IAEA’S DETECTION CAPABILITIES

Some weaponisation activities could involve declared nuclear material, or declared facilities. Examples include conversion of nuclear material to metal, possession of specialised casting and machining equipment, and use of research or other reactors to irradiate targets for materials such as polonium-210 and tritium. Where warranted by state evaluation, measures to find such indicators should be included in the IAEA’s inspection procedures (including AP complementary access, design information verification, etc).

However, by their nature many weaponisation activities will be difficult to detect. Here, there are two issues: how to identify specific locations for investigation; and how to detect indicators at such locations. In most cases the IAEA would be dependent on location-specific intelligence information. Some locations for investigation might be revealed by satellite imagery (such as high-explosive testing), though the IAEA would probably be dependent on intelligence information to prompt it to obtain images of a particular location. Other locations might be identified through environmental analysis. Some indications could be based on procurement activities, where there is no location-specific information, hence no opportunity for verification (assuming the state denies the activity).

The authors suggest that the IAEA obtain advice from NWS on the kinds of weaponisation activities it should be concerned about and relevant detection techniques, e.g. observables for inspectors to be aware of, and extension of environmental analysis to certain non-nuclear materials. Such verification activities should be added to inspections and complementary access, perhaps on a routine basis where

this is practical, but otherwise where evaluation of the particular state indicates this is warranted or would be prudent.

Because of the inherent difficulties in detecting weaponisation activities, the international community must accept that the IAEA may not be in a position to resolve particular suspicions, and that it might miss indications of certain activities. In most cases the IAEA will not be in a position to provide credible assurance of the absence of weaponisation activities – although also in most cases state evaluation should show there is no reason to believe such activities may be present. The difficulties in detecting weaponisation activities need to be taken into account in drawing safeguards conclusions. Absent unusual circumstances, safeguards non-compliance will be a strong indicator of proliferation intent – to couple non-compliance with a requirement for the IAEA to detect irrefutable proof of weaponisation will be creating an unrealistically high standard.

4. DEALING WITH INDICATIONS OF WEAPONISATION

Given the close link between weaponisation activities and diversion, the IAEA needs to include weaponisation in its information collection and evaluation processes. Where it finds sufficiently specific indicators of possible weaponisation activity it should try to resolve this, by seeking an explanation from the state and, where the information is location-specific, by investigating the location – whether by complementary access, transparency visit, or if necessary special inspection.

Where information is not sufficiently specific for on-site investigation, at the least the information should be factored into the safeguards implementation strategy for the state concerned. This also applies where the IAEA has been able to investigate and the matter was not resolved to its satisfaction. Consequential measures could include broadening the information search to see if there are other indicators (for the same or related activities), and adjustments to inspection intensity, e.g. increasing inspection frequency for nuclear material seen as a diversion risk. Verification measures aimed at detection of undeclared nuclear activities might also be intensified.

A situation of unresolved indications of weaponisation should also be reflected in the safeguards conclusion drawn for the state. It would be dangerous to conclude there are no indications of undeclared nuclear material/activities for the state, if there are reasonable grounds for believing the state is engaged in weaponisation activities.

When and how to inform the Board of Governors could be a difficult question. The state would object to reporting of unsubstantiated suspicions. The IAEA needs to devise a way of testing the suspicion, if possible by requesting access to the location in question. Refusal to grant access should be reported. If there is no location-specific information, the IAEA needs to look at wider information-search, and whether relevant verification activities can be added to inspections and complementary access. If a rigorous program of verification activities has been performed but draws a blank, it might be a case of maintaining a watch but not reporting. But given the minimal indications that were present in recent cases that turned out to involve non-compliance, decisions **not** to inform the Board need to be arrived at very carefully.

Where apparent weaponisation activities are reported to the Board, what can the Board do? Depending on the circumstances, this in itself might not be sufficient for a non-compliance finding. This would depend on whether there was a clear safeguards breach, or whether the IAEA was “not able to verify that there has been no diversion”⁴. The Board could call on the state to take required actions, such as

4. INFCIRC/153 paragraph 19.

accepting more rigorous safeguards measures, to ensure verification that nuclear material is not diverted⁵, and the Board may also call on the state to take specified confidence-building measures (e.g. suspending uranium enrichment). In appropriate circumstances the Board might decide to notify the Security Council that questions have arisen that are within the competence of the Council⁶.

5. SENSITIVE INFORMATION

Extreme care is needed in dealing with information on nuclear weapon design. For nationals of a NNWS to acquire such information, even in the course of their duty as safeguards inspectors, could be considered a breach of the NPT. The IAEA and the P-5 should establish arrangements for suitably cleared personnel to be available to secure any sensitive weapons information the IAEA comes across when investigating weaponisation activities.

6. CONCLUSIONS

Although the weaponisation issue is not well covered in INFCIRC/153, the language of the NPT indicates that the IAEA needs to be concerned with such activities, and NPT parties have a reasonable expectation that the IAEA would give timely warning where possible. Weaponisation should be of vital concern to the IAEA, not only as an indicator of intended diversion, but as an indicator of the possible existence of undeclared nuclear material/activities. Safeguards conclusions cannot ignore this latter possibility.

States have two important interests in this context:

- that the IAEA's safeguards system should operate as effectively as possible, so they can have confidence in the IAEA's conclusions about other states; and
- that they can use the safeguards system to resolve unwarranted suspicions about themselves.

It follows that states should be prepared to cooperate with the IAEA in this area. This could be passive – a willingness to cooperate in resolving questions, e.g. by providing access to locations of interest. But cooperation could also be active, through the introduction of reporting along the lines of the AP's provisions on certain nuclear-related materials and items.

Obviously states will not report actual weaponisation activities, since this would reveal they are in breach of the NPT, if not (yet) safeguards. However, where they are conducting activities of a dual-use nature, if this is for a non-nuclear purpose they should be prepared to report and provide access to the IAEA to verify (if possible) that the activities are not nuclear-related. Consideration could be given to developing a reporting system along these lines. An easy measure to agree to, for a start, should be reporting on the use of reactors to produce dual-use materials such as polonium-210 and tritium.

The safeguards system has involved a careful balance between the international community's concern for timely detection and deterrence of proliferation, and the concern of states to limit the intrusiveness of safeguards. In recent years, as proliferation threats have become more acute, the balance is shifting in the direction of the international interest. It is essential to all parties that the safeguards system is able to provide confidence about a state's performance of its peaceful use commitments - or to provide timely warning if confidence is not warranted. Arguments aimed at limiting the IAEA's verification activities are not only unhelpful to the safeguards mission, they raise suspicions about the motives of the state concerned. States should be prepared to cooperate with the IAEA in building confidence – if

5. INFCIRC/153 paragraph 18.

6. IAEA Statute Article III.B.4.

7.

they are not, the international community will come to the conclusion that the state has something to hide.