

## FMCT:

### Some Significant Divisions in the Scope Debate

Victor BRAGIN & John CARLSON

Successful completion of a Fissile Material Cut-off Treaty (FMCT) in the near future would be an important step towards the ultimate goal of eventual elimination of nuclear weapons. Of major importance to both nuclear disarmament and non-proliferation objectives, the FMCT would serve the security interests of all members of the international community and complement the Nuclear Non-Proliferation Treaty (NPT) and the Comprehensive Nuclear Test-Ban Treaty.

The FMCT will affect individual states differently due to the variance in their nuclear fuel cycles and pre-existing inventories of fissile material. Hence there are differences among national experts over what should be the ultimate aim of the FMCT and how it fits into the broader arms control, disarmament and non-proliferation processes. It is important to appreciate, however, that whatever the scope of the eventual FMCT, states that are parties to a comprehensive safeguards agreement — essentially non-nuclear-weapon states (NNWS) parties to the NPT — will by that fact alone satisfy the requirements of the FMCT. These states have undertaken not to produce or acquire nuclear weapons or other nuclear explosive devices, and to accept IAEA safeguards on all their nuclear material to verify the fulfilment of this undertaking. Therefore, the FMCT will substantively affect only those states that have not accepted comprehensive safeguards — the nuclear-weapon states (NWS) and the threshold states (TS).

Debate goes on about what specific materials and activities the FMCT should address. In terms of what the FMCT should cover, opinions span a wide spectrum — from a treaty of narrow scope, which would be limited to future production of weapon-grade material and associated facilities, to a comprehensive treaty resembling NPT safeguards. The problem is how to negotiate a treaty that is favourable for all participants, given that interests and priorities vary so much.

The authors have been invited to highlight some possible significant divisions in the scope debate that might arise in the FMCT negotiations. Accordingly it is not the aim of this short essay to present a systematic and comprehensive study on the scope of the FMCT and associated verification arrangements. Instead we formulate and discuss here some key issues related to the FMCT.

---

Dr. Victor Bragin has been involved in the development of a Fissile Material Cut-off Treaty since 1994, first as Safeguards Analyst at the International Atomic Energy Agency, and, since January 1996, as Safeguards Adviser at the Australian Safeguards and Non-Proliferation Office (ASNO). Mr. John Carlson is Director-General of ASNO, and is a statutory officer responsible directly to the Australian Foreign Minister. This paper reflects the personal views of the authors and should not be taken necessarily to represent Australian Government policy.

### *What Should Be the State's Basic Commitment Under a FMCT?*

Experts' opinions differ even over the fundamental issue of the state's basic commitment under the FMCT. It is widely accepted, and consistent with the Conference on Disarmament's decisions and United Nations resolutions, that the FMCT should prohibit production of fissile material for nuclear weapons or other nuclear explosive devices. Thus, it should be relatively easy for states to agree that upon entry into force each state party would undertake:

- not to produce fissile material for nuclear weapons or other nuclear explosive devices;
- not to use any fissile material that is subject to the FMCT for nuclear weapons or other nuclear explosive devices; and
- to accept international verification pursuant to the FMCT to provide assurance that fissile material is being produced only for non-proscribed purposes.

A FMCT based on these undertakings alone would comprise a substantial step towards the ultimate goal of nuclear disarmament.

*Though some states have sought inclusion of stocks of fissile material existing at the time of the FMCT's entry into force, we believe most key states now appreciate that the only negotiable treaty is one that deals primarily with future production.*

We assume that any eventual FMCT will focus on *future* production. Though some states have sought inclusion of stocks of fissile material existing at the time of the FMCT's entry into force, we believe most key states now appreciate that the only negotiable treaty is one that deals primarily with future production. If there is to be a successful outcome to the negotiations, we believe those states seeking the inclusion of pre-existing stocks will have to be prepared to recognize that securing a treaty applying to future production will

be a very considerable achievement, of substantial benefit to the security interests of all participants.

### *What Nuclear Material Would Be Subject to Verification?*

It is important to highlight the fundamental difference between verification arrangements under the NPT and the FMCT. Full-scope NPT safeguards are designed for states in which all nuclear material is safeguarded and which have undertaken a comprehensive commitment not to receive, manufacture or otherwise acquire nuclear weapons. The FMCT is designed to proscribe production of fissile material for nuclear weapons or other nuclear explosive devices by states that already have or may have nuclear weapons; thus, not all nuclear material would need to be subject to safeguards in the NWS and the TS.

The rationale for applying less than comprehensive safeguards under a FMCT can be summarized as follows:

- the existence in the NWS and TS of unsafeguarded stocks, produced prior to entry into force, which rules out fully comprehensive safeguards;
- practicalities:
  - the cost in absolute terms — inspection resources would have to be increased at least threefold relative to current IAEA levels to apply comprehensive safeguards;
  - cost-effectiveness (the cost in terms of strategic benefit gained) — does a comprehensive

approach yield significant additional benefits in proportion to the extra cost over a focussed approach?

- the need to keep the inspectorate to a manageable size.

At the other end of the spectrum to a comprehensive verification regime, some have proposed that the scope of the FMCT should be limited to weapon-grade material. The proponents consider this would be the most cost-effective approach. It is not clear however that significantly fewer inspections would be needed at enrichment and reprocessing plants to determine that there had been no production of weapon-grade material, relative to verification of production of “weapon-useable” material (discussed below). More importantly, it is of major concern that such a limited scope would undermine the critical purpose of the FMCT and undercut long-standing international standards in safeguards. The barriers to possible breakout would be substantially reduced because of the possibility of rapid upgrading of weapon-useable material to weapon-grade, or even the use of such material in sub-optimal nuclear explosive devices.

We envisage a verification regime primarily aimed at direct-use materials, i.e. those materials that are considered for IAEA safeguards purposes to be weapon-useable. Such material includes:

- plutonium with an isotopic concentration of Pu-238 of less than 80%;
- highly enriched uranium (HEU), i.e. containing 20% or more of the isotope U-235; and
- U-233.

These materials would be defined as “fissile materials” for FMCT purposes. We further envisage that these materials would be subject to verification only while they are in unirradiated form. This is based on the definition we believe is appropriate for “production”, i.e. enrichment and reprocessing. Production of plutonium through irradiation in a reactor should not be included, as such plutonium would be available for weapon use only after reprocessing.

Some authors suggest that verification should be limited to separated direct-use material. The difficulty is what is meant by “separated”. This could be seen as excluding fissile material, which has been blended for fuel fabrication, e.g. plutonium in MOX (mixed oxide fuel, a plutonium/uranium mix). For this reason we consider it is preferable to refer to unirradiated material.

Our definition excludes low enriched uranium (LEU), and also plutonium, HEU and U-233 in irradiated material (e.g. spent fuel or irradiated targets) or active waste. It will be important, however, to incorporate an appropriate definition of irradiated material so that material that is only lightly irradiated, or where radiation levels have significantly declined over time, will be subject to verification.

While some might consider that our definition of the material subject to a FMCT is narrow, it should be noted that it captures all fissile material produced after entry into force through enrichment and reprocessing and follows it up to the point of termination of safeguards:

- upon irradiation of the fissile material in a nuclear reactor or other intense neutron source to a level to be specified;
- upon blending of HEU or U-233 with depleted, natural or low enriched uranium so that the resulting uranium no longer meets the definition of fissile material (e.g., contains less than 20% of the isotope U-235); or
- upon determination by the verification agency that the fissile material has become practicably irrecoverable.

### *What Nuclear Facilities Would Be Covered By Verification?*

The FMCT must provide for means to verify that fissile material is not produced outside international safeguards after entry into force, and that safeguarded fissile material is not diverted for

*A treaty of wide scope would cover all nuclear facilities and material, except for pre-existing stocks and materials related to non-proscribed military activities, while a focused treaty would concentrate on only the most proliferation-sensitive fissile material production facilities, i.e. reprocessing and enrichment facilities, and relevant product from those facilities.*

use in nuclear weapons or other nuclear explosive devices, or for purposes unknown. The basic question is whether to seek a treaty with wide or with focused verification. A treaty of wide scope would cover all nuclear facilities and material, except for pre-existing stocks and materials related to non-proscribed military activities, while a focused treaty would concentrate on only the most proliferation-sensitive fissile material production facilities, i.e. reprocessing and enrichment

facilities, and relevant product from those facilities. Clearly the issues here are very similar to those discussed in the section above.

Due to resource constraints affecting the IAEA, it is apparent that the only feasible approach to safeguards implementation under the FMCT is a focussed approach, under which safeguards would apply to:

- all unirradiated fissile material produced after entry into force in both peaceful and non-proscribed military activities;
- all facilities that are (or have been or could be) capable of producing these materials (primarily enrichment and reprocessing facilities), including decommissioned, shut-down and future facilities; and
- other downstream facilities handling (storage, processing, utilization and disposal) fissile material produced after entry into force up to the point of termination of safeguards.

Under the focused approach all reprocessing and enrichment facilities would have to be declared and become subject to international verification or monitoring, regardless of their status or capacity. Although LEU would not be subject to the FMCT, all uranium enrichment activities would be subject to verification to provide assurance there is no undeclared production of HEU. It still remains to be determined what types of hot cells and R&D isotope separation facilities would have to be declared and monitored under the FMCT.

The “starting point” of safeguards under the FMCT should, in our opinion, be different from that of the comprehensive safeguards applied to NNWS under the NPT. We propose that the fissile materials defined above would become subject to verification under the FMCT when:

- plutonium, HEU or U-233 contained in irradiated material (fuel assemblies or targets) is introduced into a reprocessing plant or any other facility capable of separating subject material from fission products;
- plutonium, HEU or U-233 contained in active waste is introduced into any facility capable of recovering and partitioning these materials from fission products;
- any uranium is introduced into a uranium enrichment plant or any other facility capable of uranium isotope separation; or
- any plutonium is introduced into any facility capable of plutonium isotope separation (a separate issue is whether plutonium enrichment, which is primarily of military interest, should be proscribed).

### *What Other Facilities Would Have To Be Declared To The Verification Agency?*

Verification arrangements under the FMCT must allow timely detection of undeclared production of fissile material. This implies that, in addition to the verification arrangements for the types of facilities listed above, the FMCT might require state declarations in relation to:

- stocks of fissile material existing at entry into force and retained outside international safeguards;
- nuclear facilities involved in non-proscribed military activities, for example:
  - production of fissile material for non-explosive military uses, including HEU for naval propulsion; and
  - activities relating to the use, reuse and recycling of fissile material already in the military cycle at entry into force.

It is not realistic to require declarations by states detailing all their nuclear activities, including military activities. It is likely that a requirement to provide detailed declarations covering military activities would not be acceptable to the NWS. It is highly unlikely that the TS would be willing to reveal military nuclear activities due to the ambiguity of their nuclear status.

In our view, although no detailed information should be required on military facilities involved in activities that are not proscribed by the FMCT, where those facilities and locations contain fissile material not subject to the FMCT they should at least be listed in state declarations with a short description of their purpose (though not detailing fissile material inventories).

As regards the verification agency's right of inspection or access at any location where there is evidence warranting investigation, we think that what constitutes evidence requires careful review, since the objective is to detect undeclared production, not undeclared material. An effective managed access regime, which takes account of the need to prevent compromising states' national security or proliferation-sensitive information, will be critical to the success of the treaty.

*An effective managed access regime, which takes account of the need to prevent compromising states' national security or proliferation-sensitive information, will be critical to the success of the treaty.*

Declarations and other transparency measures might be a useful complement to routine and other inspections. They might provide a means to enhance confidence at those facilities outside a routine inspection regime or at which traditional safeguards approaches have to be modified for use in NWS/TS. In some instances, it may be necessary to have transparency measures on the basis of bilateral or multilateral agreements between and among the NWS/TS.

### *How Close Need Verification Arrangements Under The FMCT Be To Those Under The NPT?*

Verification arrangements for the FMCT do not have to be copied from those existing under the NPT due to the fundamental difference between the two treaties. There is no consensus as yet on the applicability in the NWS/TS of the new measures developed by the IAEA for the Strengthened Safeguards System (SSS).

The essence of our approach can be outlined as follows. On one hand, in the future when the SSS proves effective in providing sufficient assurance of the absence of undeclared enrichment and reprocessing activities, there can be a significant reduction in comprehensive safeguards measures

in NNWS on natural uranium, LEU and plutonium in spent fuel. “Classical” safeguards measures would be necessary mainly on material that could be broadly classed weapon-useable, i.e. HEU and unirradiated plutonium. In other words, focussed safeguards would become the appropriate model for general application. Under this line of reasoning, over time a convergence can be expected between the current safeguards regime and the measures that are likely to be introduced for a FMCT. On the other hand, however, this situation does not yet exist, as the basic precondition — that the SSS will provide the necessary assurance of the absence of undeclared activities — has yet to be established. Thus for the immediate future it will be necessary to maintain at least some elements of classical safeguards at all types of facilities in NNWS.

Deriving assurance of the absence of undeclared facilities of particular types, such as enrichment and reprocessing facilities, will be as important under a FMCT as it is under NPT safeguards. While a NWS or TS having opted to join the FMCT might have a relatively limited incentive to produce undeclared fissile material, the possibility cannot be excluded altogether, and it would be important for the FMCT to provide assurance in this regard. So we consider that classical safeguards measures applied to relevant facilities under the FMCT regime will have to be complemented by appropriate measures along the lines of those provided for in the recently concluded Model Safeguards Protocol.