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**Verification options for an FM(C)T
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Mr Chairman, Excellencies, Ladies and Gentlemen,

I am delighted to be here and very grateful to SASSI for inviting VERTIC to offer some thoughts on the way forward for an FM(C)T. If and when discussions move forward on this treaty, countries will need to consider what arrangements could be put in place to verify compliance with it. In this presentation, we provide an outline of the features and merits of the main verification options, as we see them, for a possible FM(C)T.

Previous speakers have referred to the Shannon mandate, which states that a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices should be ‘non-discriminatory, multilateral and internationally and effectively verifiable’. My presentation will focus on the last part of this mandate—how the treaty can be made ‘effectively verifiable’.

Those involved in discussions over verification of a fissile material treaty will need to keep a number of fundamental questions in mind: what do we want to verify, how reliably can it be verified and at what cost? Clarity on the scope of the treaty will facilitate more detailed discussions on verification possibilities. Conversely, technical analyses of verification options for various scenarios are likely to impact on discussions over scope.

Ultimately, formal negotiations on verification mechanisms will hinge on what parties agree to include in the treaty. The goal of any verification regime is to determine whether a party is in compliance with a defined obligation that it has undertaken. The certainty with which a verification regime can make this determination depends on the nature of the obligation in question. It is easier, for example, to verify that declared items remain in their declared places than it is to verify that all items that should have been declared are in fact declared. Moreover, the clarity and precision of treaty language will also impact on verification activities.

Verification options

There are at least two verification options that could be pursued. One would be to limit verification activities to enrichment and reprocessing facilities, and possibly their products—the ‘focused’ approach. Another would be to use a more extensive mechanism similar to the full-scope safeguards applied by the IAEA in non-nuclear-weapon parties to the NPT.

The focused approach can provide high levels of assurance on a limited but critical set of declared activities in the fuel cycle. A more extensive approach would, by contrast, provide full

verification of all declared nuclear activities within a state, and thereby add to the level of assurance by providing a more holistic overview. This may increase the possibility of detecting undeclared activities, but it would require additional resources.

That said, the focused approach could entail more than monitoring production at enrichment and reprocessing sites. Rather, weapons-usable fissile material produced after a cut-off would need to be monitored down-stream as well—whether that material was placed into storage facilities, integrated into a fuel cycle or used in research activities. Verification ‘termination points’ would need to be determined also, when HEU was down-blended to LEU, for instance. In order for materials produced after a cut-off to be reliably monitored, it may be necessary to ensure that—as far as possible—they are kept distinct from other stocks.

Non-compliance scenarios

There are two possible instances of non-compliance with a Fissile Material Cut-Off Treaty:

1. Diverting material from a declared facility; and
2. Producing material in undeclared facilities.

The first scenario is serious, albeit not very likely. Today’s material accountancy and control techniques can enable effective verification. There are some problems relating to material accountancy at reprocessing facilities, but somewhat relaxing current timeliness criteria or raising the sensitivity threshold may overcome these. Likewise, a new safeguards approach for uranium enrichment plants may solve some of the accountancy problems at large-scale facilities. These are significant but not insurmountable challenges to a focused verification regime.

The second scenario poses most challenges under a fissile material regime. The main problem with a focused verification approach is that it makes diversion to undeclared enrichment and reprocessing facilities from non-monitored parts of the fuel cycle easier. If only enrichment and reprocessing facilities are monitored, then a state could divert material from a conversion facility. Consequently, the non-compliant state only needs to construct a clandestine uranium enrichment plant to receive diverted material if it decides to produce HEU for weapons use. This is not beyond the reach of the nuclear-armed states. And these facilities would likely be very difficult to detect.

The plant itself would not necessarily draw more energy than other industrial plants, and possibly a lot less. The facility could be hidden in small, nondescript buildings and would be very difficult to detect from the outside. It would have few emissions and require very little power infrastructure. It could look more like a warehouse than an industrial site. It could even be underground. As for shipments of material, the plant could be supplied by trucks, and would therefore only need access to the road network rather than a rail connection.

On the other hand, if pre-enrichment conversion facilities are envisioned to fall under safeguards, the state must either divert the material from one of their declared facilities or build a small undeclared conversion facility to supply the enrichment plant. Diversion from a declared facility, where safeguards are applied, entails a significant risk of detection. This is particularly the case as of the early 2000s, when the starting point of safeguards was moved from the shipping area to the receipt area of the facility, making it possible to match input with output.

Building a new conversion facility is obviously also not beyond the capability of any nuclear-armed weapon state, but would increase the financial burden of non-compliance. Conversion facilities could possibly be detected at a significant distance by radionuclide detection instruments. However, if the undeclared facility was co-located with a declared conversion facility, the signatures would merge. On the other hand, co-location would involve the close proximity of inspectors verifying activities at the declared plant. Either technique for hiding clandestine conversion facilities therefore entails significant risks of detection.

Resource implications of more extensive approach

But is a more extensive approach to verification economically viable? It is certainly possible to safeguard reactors, spent fuel ponds, conversion activities, heavy water production and fuel fabrication operations. Likewise, it is possible to build a picture of the total indigenous nuclear capacity of a country—through declarations on associated infrastructure such as uranium mining and milling. Since the majority of the world’s nuclear activity is conducted in the nuclear-armed countries; this is likely to be a human- and capital-intensive exercise.

However, when considering the relative financial/resource costs of the two verification approaches, it is important to bear in mind that although the extended approach is more expensive, a considerable portion of the cost involved would result from verification of enrichment and reprocessing facilities.

Challenge and special inspections

Both verification approaches can be supplemented with a ‘challenge’ or ‘special’ inspection regime. This regime could be driven by intelligence information, NTM, whistle-blowing and possibly alarm bells triggered during the course of routine inspections. But while a potentially powerful tool, such arrangements have their difficulties. One problem is that suspicions pointing towards the need for a special inspection can create a presumption of guilt. And if a challenge inspection fails to produce any evidence to confirm these suspicions, it is conceivable that the requesting state will not be satisfied by the outcome. This relates to the problem of proving a negative. And, of course, states can blankly refuse to accept an inspection of this nature in the first place.

‘Managed access’ procedures can be used in special inspections to strike a balance between concerns over sensitive information on the part of an inspected party and inspectors’ instinct to gain as much access as possible.

Weighing-up the options for verifying a cut-off

In summary, with regard to the cut-off aspect of a treaty controlling fissile materials, it is possible to envisage two approaches, at least, that may help meet the Shannon Mandate’s call for effective verifiability. A focused approach would concentrate verification measures at enrichment and reprocessing facilities and on their products. This would be a slightly cheaper undertaking but would leave open the possibility that diversion to undeclared enrichment and reprocessing facilities might occur.

By contrast, a more extensive approach to verification would potentially lessen the possibility of diversion, but at greater expense. When developing the verification regime, it will be necessary to consider both these additional costs and the extent to which extra verification is likely to contribute meaningfully to levels of assurance, and to weigh these considerations against the possible risks from pre-enrichment diversion.

Expanding the scope: monitoring & verifying ‘pre-cut-off’ stocks

Those developing verification options for an FMT will need to build on what parties decide the purpose and scope of the regime will be. Regarding the potential extension of the treaty beyond a cut-off to include stocks produced before entry into force of the prohibition, the large uncertainties in historical production in some weapon states will make attempts to establish accurate and credible baseline inventories of nuclear material very challenging. Nevertheless, some may see the political significance of measures designed to increase transparency with regard to fissile material stocks as outweighing any concerns over potential difficulties with verification.

Concluding thoughts

Military matters: Of course, the existence of military stockpiles and the use of fissile materials in non-explosive military applications, complicates matters. Leaving these entirely outside the verification regime raises problems for both approaches in terms of diversion risks. Consequently, bringing these into a verification regime would enhance transparency, but doing so would undoubtedly present considerable challenges in terms of sensitivity and acceptability. Managed access may help. Also, excluding military stocks might somewhat negate the point of trying to construct accurate baseline inventories.

Verification bodies: Who undertakes verification has yet to be decided. The IAEA may be selected as the most appropriate body. Or an FMT body could be purpose-built. Some may prefer verification to be conducted only by P5 or P5+3 members. This would of course likely raise concerns over transparency and discrimination. The involvement of a wider group of states would perhaps increase credibility and the acceptability of findings. Concerns over the possible transfer of proliferation sensitive information to non-nuclear weapon states would exist, but these might be lessened by the use of managed access procedures.

Legal form of verification regime: If and when negotiators sit down to draft a fissile material treaty, there are a number of ways to equip the agreement with a verification regime. One way would be for the treaty to contain both its obligations and detailed verification arrangements for those obligations—as in the CWC and the CTBT. Another way would be to have verification arrangements specified elsewhere, as is the case with the NPT. Alternatively, general principles could be incorporated into a treaty with a mandate to negotiate more detailed arrangements in subsequent meetings of the parties.

It may also be possible to find useful lessons from a range of treaties regarding other aspects of the regime, such as its scope. A ‘building blocks’ approach may be possible. Some thinking would be needed on whether there have been parallel expansions of scope over time in other treaties—much would depend on the original formulation of the treaty goal.

Thank you very much for your attention.