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FISSILE MATERIAL (CUTOFF) TREATY

Background and overview of recent literature

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BASIC project on
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FISSILE MATERIAL (CUTOFF) TREATY

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BASIC project on Unjamming the FM(C)T

I. The Importance of an FM(C)T to International Security

Frustration over the failure to negotiate a treaty to ban the production of fuel for nuclear weapons has grown in recent years. A treaty pertaining to fissile material could obligate states to halt the production of nuclear weapons grade material and could also lead to the management or even reduction of existing stocks. Supporters contend that international agreement on such a treaty would have four general benefits:

- Assist in efforts to curb nuclear proliferation by preventing the production of new stocks for nuclear warheads; thereby limiting the potential for future nuclear arms races.
- Aid the global disarmament agenda, especially if a treaty were to address existing stocks.
- Reduce the likelihood of terrorists acquiring fissile material by improving controls, and limiting and diminishing availability.
- Strengthen non-proliferation norms, and reinforce reliance on using legal structures to manage international insecurities.

Disagreements over how far a Fissile Material (Cutoff) Treaty should go, and the related logjam in the Conference on Disarmament (CD) that is mandated with negotiating the treaty, have sapped momentum from the nuclear non-proliferation regime for well over a decade.¹

The 65-member CD has so far this year followed the norm, and not approved a Program of Work.² At the end of last year, however, the U.N. General Assembly passed a Canadian-led resolution calling for the U.N. Secretary General to seek the views of member states and then establish a Group of Governmental Experts (GGE) to focus on ways to facilitate progress on a treaty. The GGE will meet in 2014 and 2015. The impasse around the FM(C)T is also likely to gain more attention as the next Review Conference of the Nuclear Non-Proliferation Treaty (NPT) approaches in 2015, when states are due for their next formal stock-taking of progress on nuclear non-proliferation and disarmament. This report highlights the most important political dynamics, substantive issues, and opportunities for advancing an FM(C)T, which have been raised by analysts and policymakers to move the process forward and improve the prospects for a useful, manageable and effective treaty.

¹ Although states have yet to agree on an official treaty text, several proposed versions have existed, including drafts by the Administration of U.S. President George W. Bush in 2006 (since rescinded), and the International Panel on Fissile Materials (IPFM) in 2009. This paper follows the IPFM's practice of referring to a treaty as an "FM(C)T", recognizing that the treaty could take one of two forms. A "Fissile Material Cut-off Treaty", or FMCT, would merely "cut-off" the production of fissile material for nuclear weapons; whereas a "Fissile Material Treaty", would be broader in scope – still banning the production of fissile material but also addressing existing stocks – including banning the use of some pre-existing stocks for nuclear weapons, according to the IPFM (International Panel on Fissile Materials. Draft for discussion. "A Fissile Material (Cut-Off) Treaty: A Treaty Banning the Production of Fissile Materials for Nuclear Weapons or Other Nuclear Explosive Devices", with article-by-article explanations, September 2, 2009).

² As of February 19, 2013. (The CD's first session of 2013 began on January 21.) Also see Fihn, B. "While nuclear weapons are being tested, the CD continues to fail", *CD Reports*, Reaching Critical Will, February 12, 2013.

II. Background

The current political dynamics over how to make progress on an FM(C)T have been shaped by past attempts to forge agreement on negotiating a treaty, and remain influenced by apparent competing national security concerns, as well as already established vested interests in other nuclear non-proliferation and disarmament agendas.

(i) Brief overview of international political and strategic dynamics

Of the main five nuclear powers with recognized nuclear weapon-state status under the Non-Proliferation Treaty (NPT) of 1968, France, Russia, the United Kingdom and the United States have since the end of the Cold War declared individual moratoria on producing fissile material for nuclear weapons, with China also having indicated, less formally, that it has ceased production. These states no longer see a need for producing fissile material – perceiving that their current stocks of material are sufficient in the current security environment. Analysts have surmised that China’s reluctance to formally declare a moratorium derives from its concerns about U.S. plans for ballistic missile defense and weapons in space – concerns which have come up in the CD; and that it may want to retain the right to produce fissile material in order to advance its nuclear program as it copes with potential further strategic competition with the United States in the future.³ Despite the other four powers having declared moratoria, they have not joined together in a binding agreement - revealing their uncertainty about the role that their nuclear postures will play in international and regional security in the future.

A number of states that are not party to the NPT continue to produce fissile material for nuclear weapons programs, including India, Pakistan, North Korea, and possibly Israel. India and Pakistan’s long-fought rivalry has been the basis for Pakistan’s⁴ refusal to go along with a “cut-off” version of the treaty, contending that it would lock-in an unfair strategic advantage for India.⁵ Both countries continue to build up their nuclear arsenals. Analysts have also pointed to India’s need to manage a nuclear deterrent relationship with China.⁶ North Korea seems to have reinvigorated its fissile material production in the past few years to advance its weapons capability, and has stated in the CD that its “nuclear deterrent has served as [a] powerful deterrent for preserving peace and stability in the Korean peninsula and other parts of Northeast Asia”.⁷ The state has conveyed its dissatisfaction with the regional security environment and, in particular, U.S. influence.⁸ Israel, which has not formally declared possession of nuclear weapons but is widely believed to have them, does not share this information. Although it has said that while it would not attempt to block negotiations, it would likely oppose its own participation in an FM(C)T in part because of its sense of overall regional insecurity and policy of nuclear “opacity”.⁹ More recently Israel has demanded that Iran first cease its uranium production, which Israel believes is intended for a weapons program, rather than for the

³ Bin, L. “China” in “Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty”, International Panel on Fissile Materials, 2008, pp. 7-13.

⁴ See “The South Asian Nuclear Balance: An Interview with Pakistani Ambassador to the CD Zamir Akram,” *Arms Control Today*, December 2011.

⁵ Mian, Z. and A.H. Nayyar, “Pakistan: in “Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty”, International Panel on Fissile Materials, 2008, pp. 37-41.

⁶ See, for example, Cunningham, F. and R. Medcalf, “The Dangers of Denial: Nuclear Weapons in India-China Relations”, The Lowy Institute, October 2011.

⁷ Statement by H. E. Ambassador So Se Pyong, Permanent Representative of the Democratic People's Republic of Korea at the CD Plenary, February 28, 2012, document provided by Reaching Critical Will.

⁸ See, as examples, CD statements by the Democratic People’s Republic of Korea delivered on February 28, and July 31, 2012; May 29, 2009.

⁹ Cohen, A. and M. Miller, “Israel” in “Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty”, International Panel on Fissile Materials, 2008, pp. 27-33.

civilian energy and research purposes that Iran states.¹⁰ Arab states, led by Egypt, have demanded that Israel's stockpile be addressed under a treaty.

Non-nuclear weapon-states, particularly the large group of the Non-Aligned Movement (NAM), have also pushed for action in the CD to be accompanied by an FM(C)T that would be “**non-discriminatory**” - meaning that restrictions and verification should apply equally to all nuclear weapon and non-nuclear weapon states. The non-nuclear weapon states of the NPT are already obligated not to produce fissile material for weapons, and relevant facilities are under verification safeguards. Many of these states see the FM(C)T as contributing to eventual nuclear disarmament, if the nuclear weapons states not only cease production, but also reduce their existing stocks, all under an effectively verifiable regime.

(ii) Efforts to realize an FM(C)T

Aspirations for controlling fissile material have existed since the middle of the 20th Century, but concerted U.N. actions did not commence until the 1990s after the Cold War ended, and when U.S. President Bill Clinton in 1993 called for the establishment of an “international agreement to ban production of these materials for weapons forever”.¹¹ The U.N. General Assembly agreed Resolution 48/75L and formally defined an FM(C)T as the “Prohibition of the production of fissile material for nuclear weapons or other nuclear explosive devices.” It also recommended:

“The negotiation in the most appropriate international forum of a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices”.¹²

Responsibility for expediting the General Assembly's resolution was given to the U.N. Conference on Disarmament (CD), the United Nations' negotiating body on disarmament matters, which requires consensus among its members on both procedure and substance. Canadian Ambassador Gerald Shannon was appointed as Special Coordinator in 1994, “to determine the views of its members on the prospective **scope** of a treaty banning the production of fissile material for use in nuclear weapons.”¹³

In the 1995 report that followed (CD/1299), it became clear that the primary point of contention among members was whether to include existing fissile material stockpiles, or not: in other words, whether the agreement should serve as a ‘Fissile Material Treaty’ or a ‘Fissile Material Cutoff Treaty’, the latter of which would apply only to future production.¹⁴ The “Shannon Mandate”, as it became known, avoided issuing a decision in favor of one or the other, and affirmed that states should not be precluded from raising the issue of scope during negotiations.¹⁵

The Indian and Pakistani nuclear tests of 1998 spurred the CD to agree on the establishment of an Ad Hoc Committee to work on the treaty, but ultimately negotiations were blocked because not all members had faith that their substantive concerns would be adequately addressed during the process. Moreover, the CD's Program of Work included other difficult issues, such as preventing an arms race in space, and codifying assurances by nuclear weapon states that they would not launch a nuclear attack on non-nuclear weapon states (commonly known as Negative Security Assurances, or

¹⁰ Ibid.

¹¹ Clinton, W. “Remarks to the 48th Session of the United Nations General Assembly in New York City”, September 27, 1993.

¹² United Nations General Assembly. General and complete disarmament (A/RES/48/75).

¹³ United Nations Office for Disarmament Affairs. (Note 1).

¹⁴ The proposed treaty is consistently referred to here as the FM(C)T, recognizing that it may take one of two forms.

¹⁵ Conference on Disarmament, “Report of Ambassador Gerald E. Shannon of Canada on Consultations on the Most Appropriate Arrangement to Negotiate a Treaty Banning the Production of Fissile Material for Nuclear Weapons or Other Nuclear Explosive Devices” (CD/1299), March 24, 1995.

NSAs). Member States also had to agree on how those issues were to be addressed, thereby raising the hurdles for achieving **consensus**. Year after year, the CD was unable to approve a Program of Work and commence negotiations.

Expectations were raised in 2009 when U.S. President Barack Obama elevated nuclear non-proliferation and disarmament in his foreign and security policy agenda, and specifically, changing course from the previous administration's position that an effectively verifiable FM(C)T could not be negotiated at the time. That year, the CD managed to adopt a Program of Work (CD/1864), which shifted procedures from Ad Hoc committees to Working Groups. The Working Groups were to tackle what have become an intractable four "core issues" of the CD, with the following mandates to:

- "[E]xchange views and information on practical steps for [nuclear disarmament], including on approaches toward potential future work of multilateral character";
- "[N]egotiate a treaty banning the production of **fissile material** ... on the basis of [the Shannon Mandate]";
- "[D]iscuss substantively, without limitation, all issues related to the prevention of an arms race in outer space"; and,
- "[D]iscuss substantively, without limitation, with a view to elaborating recommendations dealing with all aspects" of "[e]ffective international arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons" [NSAs], "not excluding those related to an internationally legally binding instrument".¹⁶

Each Working Group was to "take into consideration all relevant views and proposals, past, present and future".¹⁷

The effort stopped short, however, as Pakistan broke the consensus, repeating its previous qualms about the potential for a treaty to ignore pre-existing fissile material stocks and citing its ongoing security dilemma with India. Pakistan said that its previous concerns had been compounded because of a U.S. agreement to allow the sale of nuclear material and technology to India for its civilian energy program – which Pakistan contends could provide an unfair advantage by freeing up more of India's indigenous material for its nuclear weapons program.¹⁸ Again, the CD returned to its deadlock; without a Program of Work agreed to include an FM(C)T. Although the blame has become focused on Pakistan, many analysts have suggested that other states have substantive concerns that still might impair the successful negotiation of a treaty.¹⁹

¹⁶ Conference on Disarmament, "Decision for the Establishment of a Programme of Work for the 2009 Session", CD/1864, May 29, 2009; UNIDIR, "A Fissile Material Cut-off Treaty: Understanding the Critical Issues," Geneva, 2010, p. 8.

¹⁷ Ibid.

¹⁸ Mian, Z. and A.H. Nayyar, "Playing the Nuclear Game: Pakistan and the Fissile Material Cutoff Treaty", *Arms Control Today*, April 2010, pp. 20-21.

¹⁹ See as some examples, "China", "Israel", and the "United States" in "Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty", International Panel on Fissile Materials, 2008.

III. Managing Substantive Issues of an FM(C)T

Without any concrete progress to negotiate an FM(C)T in the CD, analysts have continued to examine the most challenging **substantive issues** to see whether a particular understanding and treatment of them could increase the willingness of states to agree on negotiations, or at least be better prepared for a time when the treaty could be negotiated and implemented. The literature often emphasizes that the most challenging of these issues is **verification**. Managing the verification process will require an initial set of agreed **standards**, including not only the common understanding of **definitions** and acceptance of **scope**, but also agreed verification methods for inspecting, recording and sharing information; and also agreed means for covering associated expenses.

The specific methods of verification will not be covered below, as they are too numerous for the space permitted here, but they are subject to decisions made on a number of other aspects around a treaty. Oft-cited issues are summarized below, including: definition of fissile material; scope of obligations and verification of compliance and methods of funding activities.²⁰

(i) Definitions of fissile material and production

Deciding what qualifies as fissile material, its production, and production facilities for the purposes of a treaty remains open for resolution. The IAEA and Euratom, for example, have already established their own definitions, but states disagree over whether these definitions are suitable for the purposes of a treaty. In particular, concerns remain that a treaty with an inadequate definition would encourage states to take advantage of existing loopholes for production of material that is fissionable but for civilian purposes.^{21,22}

Options

Some states prefer the IAEA's definition of "direct-use"–fissile material 'that can be used for the manufacture of nuclear explosive devices without further enrichment or transmutation', while others would prefer a broader interpretation.²³ While broadening that definition to include, for example, materials that could be fissile but are less common, such as americium and neptunium, could close potential loopholes, some fear that this could also lead to more verification effort and expense,²⁴ which may or may not be warranted given their unlikely use in weapons.²⁵ The United States has favored the narrower "direct-use" definition, whereas Pakistan prefers the latter, broader definition.²⁶

The International Panel on Fissile Materials (IPFM), which is made up of independent experts from nuclear and non-nuclear weapons states, has proposed alternative operational definitions for fissile

²⁰ The IPFM's draft FM(C)T also stipulates terms for a review process, enforcement, settlement of disputes, and withdrawal. These issues are covered less in the literature as they pertain to an FM(C)T, although how they are addressed in negotiations will influence whether states ultimately decide to agree and ratify a treaty.

²¹ Nonproliferation expert and former U.S. official Robert Einhorn has suggested that material for civil or non-explosive military (mostly naval reactors) uses might also need to be covered even though it has not been the focus of an FM(C)T before, because of possible terrorist access and use. As part of his proposal, he suggests a Fissile Material Control Initiative could coordinate some of these efforts while an FM(C)T remains out of reach, but also as a parallel effort (Einhorn, R. "Controlling Fissile Materials and Ending Nuclear Testing", Paper for conference: "Achieving the Vision of a World Free of Nuclear Weapons", International Conference on Nuclear Disarmament, Oslo, Norway, February 26–27, 2008, p. 3).

²² Ford, C. "Still Struggling with the FMCT," April 18, 2011, New Paradigms Forum, based on presentation: "The Obama Administration and the Future of Arms Control," Boston College, April 15, 2011.

²³ IAEA Safeguards Glossary.

²⁴ Arms Control Association, Fissile Material Cut-off Treaty (FMCT) at a Glance, updated August 2012.

²⁵ Kile, S. and R. E. Kelley, "Verifying a Fissile Material Cut-off Treaty: Technical and Organizational Considerations", *SIPRI Policy Paper* 33, August 2012, p. 5.

²⁶ Arms Control Association, Fissile Material Cut-off Treaty (FMCT) at a Glance, updated August 2012.

materials and relevant production facilities – all detailed in the IPFM’s draft FM(C)T of 2009.²⁷ Besides including the commonly-used standards of Highly Enriched Uranium (HEU) and plutonium, the draft treaty includes the option of adding a protocol should states later decide that other material be included as fissile under the treaty.²⁸

In 2011, Australia and Japan sponsored a three-day event for experts on the side of the CD in Geneva to grapple with the substantive issues of definitions of existing stocks and fissile material production. The range of definitions and variations therein revealed the fair number of options and ongoing challenges of trying to decide on the appropriateness of particular definitions,²⁹ Mikael Shirazi covered the meeting in detail for VERTIC and reviewed how the process was received by various key states, noting that China and Pakistan refused to participate in the meeting, with the former citing the lack of participation by other key states, and the latter citing that such meetings undermine the CD.³⁰ (See Appendix II of this report for a list of definitional options from the workshop.)

(ii) Scope of obligations

The Shannon Mandate also left open whether an FM(C)T would include **existing stocks**. Including existing fissile material stocks would satisfy demands by those who want an FM(C)T to make a stronger contribution toward disarmament, and also for those states that are worried about competitors solidifying an advantage with larger stockpiles before a treaty would enter into force. Other states would rather keep their existing stocks off limits.

Options

Jean du Preez, an expert with the Center for Nonproliferation Studies, has described for the Weapons of Mass Destruction Commission (also known as the “Blix Commission”) the full spectrum of options between only the cut-off version of the treaty through to the full incorporation of stocks. He suggests how an agreement could fall somewhere in the middle and how the inclusion of existing stocks and halting future production need not be addressed all at once and would depend on what parties would accept at first.³¹ In order to build confidence on the ultimate goal of addressing and reducing some existing stocks, a timetable could be established, even as initial steps would focus on a treaty that merely cuts off production of new material.³² A treaty could include in its preamble a stipulation that Nuclear Weapon States (NWS) would eventually address their existing fissile material stocks. Du Preez explains the merit of this approach: “A fissile material ban should at least be a starting point to deal with existing stocks in a multilateral framework. In other words, a FMT could serve as a transitional point where the NNWS [Non-Nuclear Weapon States] can start the

²⁷ International Panel on Fissile Materials. Draft for discussion. “A Fissile Material (Cut-Off) Treaty: A Treaty Banning the Production of Fissile Materials for Nuclear Weapons or Other Nuclear Explosive Devices”, with article-by-article explanations, September 2, 2009.

²⁸ The IPFM’s 2008 report focused on scope and verification, mapped where key enrichment facilities were located, and also reviewed the measures and viability of verifying an FM(C)T. The IPFM has concluded that effectively verifying a treaty should be possible (IPFM, Global Fissile Material Report 2008, Scope and Verification of a Fissile Material (Cutoff) Treaty, 2008).

²⁹ Australia–Japan Experts Side Event on FMCT Definitions. “Fissile Material” and “Production”, Four broad options raised by participants at the experts side-event on FMCT definitions, Conference on Disarmament, Geneva, February 14-16, 2011, Report of the Chair, Ambassador Peter Woolcott of Australia (CD/1906), March 14, 2011, available on the U.N. Office at Geneva’s website. Also see “Japan-Australia Experts Side Event on FMCT Verification” held at the Palais des Nations on May 30-June 1, 2011, from Permanent Mission of Japan to the Conference on Disarmament, addressed to the Secretary-General of the Conference (CD/1917), August 30, 2011, available on the U.N. Office at Geneva’s website.

³⁰ Shirazi, M. “No progress as CD breaks for first 2011 recess”, VERTIC blog, April 8, 2011.

³¹ du Preez, J. “The Future of a Treaty Banning Fissile Material for Weapons Purposes: is it Still Relevant?”, Chapter 9 in report of the Weapons of Mass Destruction Commission.

³² du Preez, p. 19.

nuclear disarmament process, thereby making the NWS accountable to their undertakings”.³³

In its draft treaty of 2009, the IPFM emphasized a method that would not immediately require the elimination of existing stocks, but would instead require greater transparency, a need to declare: “...national inventories of all fissile materials, in its possession or under its control, by category: in civilian, nuclear-weapon and military non-explosive use,” and a report on progress made by each party state to reduce such stockpiles.³⁴ This requirement for nuclear weapon states could enable a clearer understanding of their competitors’ stocks and indicate progress on the disarmament agenda.³⁵ Yet nuclear weapon states have so far been uncomfortable with such a proposed level of transparency. The P5 have held a series of multilateral meetings since 2009, in which the issue of transparency has been discussed. (See more on the P5 below.)

The International Commission on Nuclear Non-Proliferation and Disarmament (ICNND) has recommended a “phased-approach” for dealing with pre-existing stocks: first nuclear armed states would make voluntary declarations, place them under IAEA safeguards, and end the use of HEU in civilian research and use of separated Plutonium in energy reactors. All nuclear armed states would then declare formal moratoria, while still pursuing full FM(C)T negotiations in the CD.³⁶

(iii) Verification of compliance

The literature on an FM(C)T consistently makes clear that verification of compliance will be one of the most challenging issues – both for reaching agreement and implementation. Non-compliance under an FM(C)T could include scenarios such as clandestinely producing fissile material at an undeclared facility, or even diverting material from a declared facility.³⁷ The methods of verification range from using satellite-based imagery, to dedicated remote monitoring, and on-site inspections.³⁸ Given the myriad of facilities and stockpiles that could come under FM(C)T verification, and the various associated implementation methods, establishing a thorough verification regime will still not guarantee the absence of cheating. But, as nuclear expert Annette Schaper points out, “a large detection risk implies deterrence”.³⁹ However, verification solutions can pose their own potential problems, such as the unintended exposure of sensitive information related to national security and higher expenses for the institution responsible for implementation.

Options

Schaper has suggested that ultimately, like the IAEA’s implementation of comprehensive safeguards in the non-nuclear weapons states, the goal should be to include the entire fuel-cycle under an FM(C)T as part of the treaty’s verification process, but that initial focus will be on “direct-use” material” for practical purposes.⁴⁰ Non-Nuclear Weapons States of the NPT currently have their civilian nuclear programs subjected to comprehensive safeguards as part of their NPT obligations,

³³ du Preez, p. 18.

³⁴ IPFM, Draft FM(C)T, Article-by-Article Explanation.

³⁵ The IPFM expanded upon this proposal in, “Increasing Transparency of Nuclear-warhead and Fissile Material Stocks as a Step Toward Disarmament: A Preliminary Set of Proposals”, by the International Panel on Fissile Materials, May 3, 2012.

³⁶ ICNND, “Limiting the Availability of Fissile Material”, Eliminating Nuclear Threats – A Practical Agenda for Global Policymakers”, Commission report, 2009, <http://icnnd.org/Reference/reports/ent/part-iii-12.html>

³⁷ Persbo, A. “A Verifiable Ban on Fissile Material Production”, in *A Fissile Material Cut-off Treaty: Understanding the Critical Issues*, UNIDIR, 2010, p. 42.

³⁸ Zhang, H. and F.N. von Hippel. “Using Commercial Imaging Satellites to Detect the Operation of Plutonium-Production Reactors and Gaseous-Diffusion Plants”, *Science & Global Security*, [Available on the website of the Belfer Center for Science and International Affairs], Vol. 8, pp. 219-271, September 2000, p. 232.

³⁹ Schaper, A. “Verification of a Fissile Material Cut-off Treaty”, in *Fissile Materials: Scope, Stocks, and Verification*, Disarmament Forum, UNIDIR, 1999, p.50.

⁴⁰ Schaper, A. 1999, p. 50. Elsewhere, Schaper argues that eventually a universal verification regime will be required, and argues that the costs would not be insurmountable (“A Treaty on Fissile Material: Just Cut-off or More?” Frankfurt: Peace Research Institute, 2011).

and expect that, for an FM(C)T to be **non-discriminatory**, the treaty should also address civilian energy programs of the NWS.

Thus, deciding on how far verification should go has ranged from “comprehensive” to “focused” approaches. States have different levels of comfort at various points on this spectrum. As Executive Director of VERTIC, Andreas Persbo points out, under the “cut-off” version of the treaty:

“An FMCT would not alter the nuclear-weapon states’ right to manufacture, store and deploy nuclear arms. Therefore, large amounts of legitimate fissile material will be present on the territories of the states parties. There is little point in monitoring this pool of material, since the state is free to make use of it as it sees fit. This is an argument in support for the idea that a treaty, and its verification regime, should be focusing on the back-end of the weapons fuel cycle rather than on the entirety of the fissile material manufacturing line.”⁴¹

Experts Shannon Kile and Robert E. Kelley explain that following this “focused approach”, “the most proliferation-sensitive production facilities and the treaty-relevant fissile material produced by these facilities” would be subject to verification. In a limited version of this option, “a state party would be required to declare and make subject to verification all uranium-enrichment and spent fuel reprocessing plants on its territory, regardless of their operational status or capacity”, which is sometimes called a “**narrow-scope approach**”.⁴² “[M]easures would be applied only to verify the inputs and outputs of declared reprocessing facilities and to verify the absence of HEU production for weapon purposes in declared uranium-enrichment plants.”⁴³

Kile and Kelley also describe the other end of the spectrum - under a “**wider-scope approach**”, “[v]erification measures based on nuclear material accountancy could be applied at downstream facilities, such as storage sites and fuel-fabrication plants, that handle newly produced HEU or newly separated plutonium, to provide assurance about the non-diversion of the material.”⁴⁴

The IPFM has recommended that verification lean more toward the comprehensive end of the spectrum: “At a minimum, a verified FM(C)T should require the IAEA to verify that any HEU produced and plutonium separated by an FM(C)T Party after the treaty comes into force is not diverted to weapons use. This would involve IAEA monitoring of all enrichment and reprocessing plants and any fissile material that they produce after the Treaty comes into force.”⁴⁵ The IPFM’s draft treaty’s verification section stipulates that all parties undertake acceptance of IAEA safeguards.

Former U.S. special representative on non-proliferation Christopher Ford has argued against requiring a formal verification regime at all, at least at the outset, contending that the hurdles involved would not be worth the cost because the FM(C)T cannot be effectively verified.⁴⁶ He also warns that the verification procedures themselves could become a means by which knowledge of nuclear weapons production becomes proliferated⁴⁷ and could also lower standards below the IAEA’s model Additional Protocol.⁴⁸ Instead, Ford suggests that an “eight party FMCT” could be

⁴¹ Persbo, A. “A Verifiable Ban on Fissile Material Production”, in *A Fissile Material Cut-off Treaty: Understanding the Critical Issues*, UNIDIR, 2010, p. 40.

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ “Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty Banning the Production of Fissile Materials for Nuclear Weapons, Companion Volume to Global Fissile Material Report 2008, International Panel on Fissile Materials, 2008.

⁴⁶ Nuclear expert Hui Zhang explores in technical detail whether an FM(C)T could meet the “effective verification” standard, and argues that it can, at a manageable cost (Zhang, H. “Can and Should the FM(C)T be Effectively Verified?” International Network of Engineers and Scientists Against Proliferation, Bulletin 28, April 2008.)

⁴⁷ Ford, C. “Five Plus Three: How to Have a Meaningful and Helpful Fissile Material Cutoff Treaty”, *Arms Control Today*, April 2009.

⁴⁸ Ibid.

pursued, which would include only those states already in possession of nuclear weapons and they could “let verification provisions be tailored to the verification needs of each party, if any, without having to work out a one-size-fits-all approach that applies uniformly and coherently to possessors of nuclear weapons as vastly differently situated as the various members of the eight”.⁴⁹

The nuclear weapons states would not agree to a method that would potentially compromise their own sensitive national security information. For example, the verification of highly-enriched uranium (HEU) produced for naval propulsion has often been cited as a sensitive issue “...because the design of naval fuel is highly classified” but according to nuclear proliferation expert John Carlson, this is manageable and “...required to ensure this does not become a route for diversion.”⁵⁰ Frank von Hippel, nuclear expert with Princeton University and Co-Chair of the IPFM and Arend Meerburg, nuclear expert and former diplomat, have discussed in further depth mechanisms for monitoring naval fuel, and recommend that, “the best solution from many points of view would be for LEU [rather than HEU] fuel to become the norm”.⁵¹

(iv) Methods of funding activities

Even after deciding what institution will be the legitimate body for carrying out inspections and keeping track of fissile materials, a key issue remains in ensuring that it will have the proper capacity for carrying out its duties.

Options

The IAEA might be the most economical choice for an agency dedicated to verification because of the work it already does in administering comprehensive safeguards in the non-nuclear weapons states. Von Hippel and Meerburg have warned, however, that the IAEA does not currently have the resources to cover work in the United States under an FM(C)T, much less in all other nuclear weapons states,⁵² and that the IAEA already faces challenges of capacity.

Analyst Arun Vishwanathan has examined in detail ways to bolster IAEA funds for carrying out FM(C)T activities, including: assigning the primary burden to nuclear weapon states or dispersing the costs more widely among all CD members.⁵³ He adds that other organizations with relevant verification expertise, which might also contribute to such a super-agency, include the Organization for the Prohibition of Chemical Weapons, and the Comprehensive Nuclear Test Ban Treaty Organization.⁵⁴

As an alternative, interim measure, Jean du Preez has pointed out that some consideration has been given to using the already-agreed Trilateral Initiative between Russia, the United States and the IAEA, as a way to work out verification mechanisms and to build confidence in these two states’ commitment to the FM(C)T, and thus serving as a type of role model. However, the Initiative itself has faced problems over cost, and what material and how intrusive inspections should be. His discussion covers suggestions for breaking the impasse of the Initiative as a way forward, gradually growing it outward to eventually allow the acceptance of an FM(C)T.⁵⁵ National Technical Means,

⁴⁹ Ford, April 2009. Ford intentionally leaves out North Korea, citing their stated intention to return to the NPT as a non-nuclear weapons state, and suggests that in order to hold them to this promise, they should not be included in this arrangement.

⁵⁰ Carlson, J. “Can a Fissile Material Cutoff Treaty be effectively verified?” *Arms Control Today*, January/February 2005.

⁵¹ Meerburg, A., and F.N. von Hippel, “Complete cutoff: Designing a comprehensive fissile material treaty”, *Arms Control Today*, March 2009.

⁵² Hippel, F. and A. Meerburg. “Key countries and a Fissile Material (Cutoff) Treaty”, *Arms Control Today*, March 2009, p. 22.

⁵³ Vishwanathan, A. “Verification of the FMCT: Lessons from IAEA, OPCW and CTBTO”, *Institute for Defence Studies and Analyses*, April 2009.

⁵⁴ Vishwanathan, A. April 2009.

⁵⁵ du Preez, J. WMD Commission, 2006.

could also contribute to verification measures when states are willing; an option discussed by Kile and Kelley.⁵⁶

⁵⁶ Kile, S. and R. E. Kelley, August 2012, p. 17.

IV. Advancing Negotiations

While substantive issues pose challenges, many believe that the politics of procedural issues have been critical to the impasse, and if negotiations could begin in the right way, then at least states could grapple with the substance of the treaty in earnest. The lack of progress has motivated some experts and leaders to look outside of the CD to find openings, either to ultimately reinvigorate the CD process, or to abandon it entirely. Some have suggested that informal diplomacy could offer a way around divisions⁵⁷ and could also be conducive to producing agreement on divisive technical matters.

(i) The consensus requirement of the CD

Dropping the consensus requirement of the CD for procedural issues has been suggested as a way to allow the commencement of work on substantive issues and in particular to remove at least one hurdle blocking FM(C)T negotiations in its agreed home. The WMD Commission of 2006 proposed this route. Chaired by former IAEA Director-General Hans Blix, with 13 experts and former officials, the Commission recommended that the CD “should be able to adopt its Programme of Work by a qualified majority of two-thirds of the members present and voting. It should also take its other administrative and procedural decisions with the same requirements”.⁵⁸

Kassym-Jomart Tokayev of Kazakhstan, Director-General of the U.N. Office at Geneva and Personal Representative of the U.N. Secretary-General to the CD, has proposed the appointment of a “Special Coordinator” to examine the history of how the rules of procedure have been implemented, with the aim of seeing whether the CD’s procedural rules could be changed by members to allow for the commencement of substantive work.⁵⁹ Analyst Sarah Estabrooks recounts the work of the Six President’s Initiative, or P6 Initiative, which worked along the CD but was not under the Shannon Mandate.⁶⁰ The P6 Initiative allowed for informal but substantive discussion, even though a formal Program of Work had not been agreed. Non-proliferation expert Patricia Lewis noted that despite some opposition, the exercise showed that other ways around the usual CD practices could contribute meaningfully to the process.⁶¹ The P6 Initiative could not move forward on negotiations, however, without a formal mandate and thus the substantive issues discussed “remained in the realm of the ‘ad hoc,’” according to Estabrooks.⁶²

Canada in 2012 had suggested to the CD not to require consensus approval of procedural issues. Other suggestions were made to the President of the CD, including: lengthen the presidency or change how the presidency is chosen; review the need for an annual Program of Work and instead use one on a rolling basis.⁶³ Canada also noted that nothing in the rules of procedure precluded members from working in the absence of a Program of Work.⁶⁴

⁵⁷ Estabrooks, S. Getting Back to Work? The P6 Initiative and Informal Debates in the Conference on Disarmament. website of the *Ploughshares Monitor*, 2006.

⁵⁸ WMDC Recommendation 58, 2006, p. 180.

⁵⁹ See “Remarks to the Conference on Disarmament by Mr. Kassym-Jomart Tokayev”, The United Nations Office in Geneva website, February 14, 2012.

⁶⁰ Estabrooks, S. “Getting Back to Work? The P6 Initiative and Informal Debates in the Conference on Disarmament”, *Ploughshares Monitor*, 2006.

⁶¹ Lewis, P. “The Ban on Fissile Materials for Weapons Purposes (FM(C)T): New Opportunities”. Paper commissioned by the International Commission on Nuclear Non-Proliferation and Disarmament (ICNND), n.d.

⁶² Estabrooks, 2006.

⁶³ Revitalization of the Conference on Disarmament, Canadian statement to the Conference on Disarmament, June 14, 2012. (Statement delivered by Kelly Anderson, Counsellor, Deputy Permanent Representative of Canada to the Conference on Disarmament, available on the website of Reaching Critical Will.)

⁶⁴ Ibid.

(ii) Taking the process out of the CD

The U.N. Secretary General in July 2011 warned that the U.N. General Assembly might need to intervene on the CD's FM(C)T impasse, with the implication that the United Nations might facilitate negotiations on an FM(C)T outside of the CD. However, key countries, including Pakistan, China and Russia have so far strongly opposed such moves.

Taking the FM(C)T negotiations out of the CD could happen in a number of ways, and a few prominent ones are sketched below. These proposals would not necessarily preclude the eventual establishment of an FM(C)T, but the core assumption is that the FM(C)T process is unlikely to move forward anytime soon and that other separate arrangements should be made to enable more action on controlling or cutting off fissile material.

Christopher Ford, former U.S. special representative for nuclear nonproliferation,⁶⁵ has recommended that current nuclear-armed states forge an agreement among themselves outside of the CD framework. This process would avoid the impasse in the CD and place the emphasis on the fewer number of states that have been using fissile material for weapons. Ford argues that having a “non-discriminatory” FM(C)T is not essential as it is precisely the states that have been producing fissile material for nuclear weapons that matter.⁶⁶ Although the agreement would not be bound –up with the other non-nuclear weapons states that participate in the CD, he explains that “the duration of a Five Plus Three FMCT, as it applies to any state party, should be such that the treaty would cease to apply to a state that joins the NPT as a non-nuclear-weapon state. This duration provision would thus make clear that an FMCT is not an end point but rather a step toward the global applicability of the NPT...”⁶⁷

Paul Meyer, former ambassador who served as Canada's Permanent Representative to the United Nations and the CD, has suggested that as a first step, the five original NPT Nuclear Weapons States could agree to an FM(C)T, thereby skirting the blockages caused by other non-NPT nuclear weapons states, and bolstering their non-proliferation credibility and initiating a level of verification procedures beyond the current regimes. Such action could increase confidence outside of the group – helping in some measure to ease the way for other nuclear weapon states to eventually join.⁶⁸ In tandem, he has encouraged the United States to push harder on moving negotiations forward, even if the negotiations need to be done outside of the CD.

Zia Mian, a South Asian security expert with Princeton University and member of the International Panel on Fissile Materials, has proposed using a “framework convention”⁶⁹ on fissile materials (similar to the 1992 U.N. Framework Convention on Climate Change), as part of a longer “path toward disarmament” which could serve the interests of nuclear weapons states in and outside of

⁶⁵ This position does not reflect the one of the current U.S. Administration, which has said that it will pursue an effectively verifiable treaty though opposes having the FM(C)T include a new verification regime, and also prefers the CD (Defense Treaty Inspection Readiness Program, “Fissile Material Cutoff Treaty”, U.S. Department of Defense, accessed February 26, 2013, <http://dtirp.dtra.mil/tic/synopses/fmct.aspx>). Chief arms control negotiator Rose Gottemoeller had indicated at one point that other alternatives may need to be examined if the FM(C)T remains blocked in the CD (Elaine Grossman, “U.S. Opposes Moving Nuclear Material Talks Out of Geneva: Senior Official”, Global Security Newswire, August 4, 2011).

⁶⁶ Ford, C., April 2009.

⁶⁷ Ibid.

⁶⁸ Meyer, P, “Free the Fissile Material Cut-off Treaty: Functionality over forum”, *Bulletin of the Atomic Scientists*, September 19, 2011.

⁶⁹ See Lewis, P. for a description on Australia's proposal for a “framework instrument”, to ban fissile material, which would include a “phased approach”: 1. banning production only; 2. transparency regime for all stocks; 3. control of stocks; and, 4. careful and controlled handling of sensitive information”. She explains that the approach would avoid carrying out these steps “in a vacuum, rather progress would depend; on other disarmament progress. The more reductions in nuclear weaponry among the NWS, the more progress could be made in the multilateral fissile material talks”. (“The Ban on Fissile Materials for Weapons Purposes (FM(C)T): New Opportunities”. Paper commissioned by the International Commission on Nuclear Non-Proliferation and Disarmament (ICNND), n.d., p. 13.)

the NPT, as well as non-nuclear weapons states. The process would include the creation of a formal negotiating machinery (outside of the CD), and deadlines for meeting certain safeguards and reduction goals.⁷⁰

The Weapons of Mass Destruction Commission also recommended as an interim step that states with nuclear weapons agree to a moratorium together and open up their fissile material production facilities to IAEA inspection “building on the practice of Euratom inspections in France and the UK”. These states would begin working on verifiable limitations on existing stocks.⁷¹

U.S. advisor⁷² and nonproliferation expert Robert Einhorn, has suggested that the conditions behind the FM(C)T’s impasse in the CD are unlikely to change in the near-term, and has proposed that at least in the interim states pursue a Fissile Material Control Initiative (FMCI). The Initiative would prepare the groundwork for an FM(C)T, address existing stocks, and would be a:

“[V]oluntary, multilateral arrangement open to any country that possessed fissile material (whether safeguarded or not) and was willing to sign onto a set of agreed principles. The overall goals of FMCI would be to increase security, transparency, and control over fissile material stocks worldwide; to prevent their theft or diversion to non-state actors or additional states; and to move fissile materials verifiably and irreversibly out of nuclear weapons and into forms unusable for nuclear weapons”.⁷³

Einhorn adds that the FMCI could exist in parallel with an FM(C)T, with the former focusing on addressing pre-existing stocks, and the latter mandating the cut-off of new production. But until states can negotiate an FM(C)T, the FMCI process could also help states prepare and become more comfortable with practices that would be relevant under an FM(C)T.⁷⁴

Research Fellow with RUSI, Andrea Berger⁷⁵ has also said that the most promising way forward would be a P5-plus approach, where the various concerns of the states that currently have nuclear arsenals could be worked out – first among the P5 and then possibly working on different issues with those nuclear weapon states outside of the NPT – through selective and closed discussions.⁷⁶ Berger describes the three options often considered, including, “...General Assembly negotiations, a U.N. conference similar to the one held in July to negotiate an arms trade treaty (ATT), and an ‘Ottawa process’, which would consist of a series of conferences entirely outside of the U.N. system. All three encounter similar problems: they do not secure the participation of the key states, or they are not conducive to the sensitive discussions among military fissile material producers that an FMCT requires at this stage.”⁷⁷

Taking it a step further than Ford, Berger suggests forgoing attempts to incorporate Israel for the time-being, as its undeclared arsenal does not seem to pose an immediate problem for the other nuclear weapon states, but she says focusing on the P5 first, and then drawing in India and Pakistan, would be the best promise for moving forward on meaningful negotiations.⁷⁸ She suggests, unlike

⁷⁰ Mian, Z., “The Fissile Material Challenge and the Conference on Disarmament,” International Panel on Fissile Materials, United Nations Secretary General's Advisory Board on Disarmament Matters, New York, February 25, 2011.

⁷¹ WMDC Report, 2006, p. 105.

⁷² Robert Einhorn is currently a Special Advisor on Nonproliferation and Arms Control with the U.S. State Department. At the time of the cited article, he was not serving in this official capacity, and was an expert with the Center for Strategic and International Studies in Washington, D.C.

⁷³ Einhorn, R. 2008, p. 5.

⁷⁴ Einhorn, R. 2008, p. 6.

⁷⁵ Berger, A. “Finding the Right Home for FM(C)T Talks”, *Arms Control Today*, October 2012.

⁷⁶ Ibid.

⁷⁷ Ibid.

⁷⁸ Ibid.

Ford's proposal, that an FM(C)T agreement reached among this group would still be worth submitting for membership to the far larger non-nuclear weapons states, because their participation "...could create notable regulatory harmony in the international verification regime if it required non-nuclear-weapon states to sign an additional protocol to their IAEA safeguards agreement or adopt a similar verification framework."⁷⁹

(iii) External formal and informal discussions to support the CD

The Non-Proliferation and Disarmament Initiative (NPDI)

The Non-Proliferation and Disarmament Initiative (NPDI), led by Australia and Japan, and also including Canada, Chile, Germany, Mexico, the Netherlands, Poland, Turkey and the United Arab Emirates, has been seeking ways to make progress on the implementation of the NPT Review Conference 2010 Action Plan, including negotiation of an FMCT. The NPDI submitted a joint working paper to the 2012 NPT Preparatory Committee, on practical steps to implement the Action Plan with respect to an FMCT.

In 2011, Australia and Japan hosted discussions that focused on operational definitions⁸⁰ of what constitutes fissile material and its production, and more technically-focused discussions have continued since, which Germany and the Netherlands also led in 2012.

However, China and Pakistan have made a point of warning that conclusions drawn from meetings outside of the CD do not qualify as formal aspects of FM(C)T negotiations.⁸¹ China was the only NPT nuclear weapon state to have abstained from those informal technical meetings. The NPDI will hold its sixth ministerial meeting in April of this year to address elements on the NPT Review Conference's 2010 Action Plan.

The Group of Governmental Experts (GGE)

The First Committee of the U.N. General Assembly adopted Canadian-sponsored Resolution A/C.1/67/L.41/Rev/1 (A/RES/67/53) on November 5, 2012 for the Secretary General to seek the views of member states on an FM(C)T and submit a report in 2013, and for the creation of a U.N. Group of Governmental Experts (GGE), which will begin formally in 2014 and last until 2015. Meetings will occur for two weeks twice in each year in Geneva, and will include 25 member states based upon equitable geographic representation.⁸² The GGE will make recommendations on possible aspects that could contribute to a treaty. This initiative has the remit to suggest the necessary steps toward negotiating a treaty, but it does not have the authority to negotiate one itself. Similar to past GGE processes, members are expected to represent a variety of views and be appointed in part on the basis of reports submitted to the Secretary General.⁸³ Votes for the overall resolution were: 148 in favor, 1 against, and 20 abstained. Of the states with nuclear weapons programs, France, India, Russia, the United Kingdom and the United States voted in favor; Pakistan opposed; and China, Israel and North Korea abstained.⁸⁴ Pakistan opposed the resolution because it said that such actions could undermine the CD.⁸⁵ Other states that abstained echoed concerns that the process could go too far afield from the CD.

⁷⁹ Berger, A., October 2012.

⁸⁰ See, for example, Appendix II of this report for an overview of possible fissile material definitions.

⁸¹ Crail, P. "Pakistan's Nuclear Buildup Vexes FMCT Talks", *Arms Control Today*, March 2011.

⁸² Taylor, M. "U.N. First Committee Seeks FMCT Progress", *Arms Control Today*, December 4, 2012.

⁸³ Taylor, December 4, 2012.

⁸⁴ First Committee, Vote Name A/C.1/67/L.41/ Whole , November 5, 2012, available on the website of Reaching Critical Will: <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com12/votes/L41.pdf>

⁸⁵ Pakistan, Explanation of Vote before the vote on draft resolution entitled: "Treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices" contained in document A.C.I/67/L.41, document available on the website of Reaching Critical Will.

Open Ended Working Group

The U.N. First Committee also approved a resolution (A/C.1/67/L.46; A/RES/67/56) in 2012 to establish an “Open-Ended Working Group” that would convene in Geneva in 2013 for 15 days and “to develop proposals to take forward multilateral nuclear disarmament negotiations for the achievement and maintenance of a world without nuclear weapons”. While not explicitly mentioning the FM(C)T, the treaty and other “core issues” may be addressed. Unlike the GGE, the OEWG is open to all member states. France, Russia, the United Kingdom, and the United States voted against this resolution, which was led by Austria, Mexico and Norway. China, India, and Pakistan abstained, and North Korea voted in favor. The literature is unclear as to what extent the group will address an FM(C)T and whether it will work to have a direct impact on influencing preparations for the GGE process.

(iv) Diplomatic assurances focused on nuclear possessor states

Addressing the security concerns of nuclear possessor states and improving relationships between them is a logical but difficult task in helping to move the negotiations forward. Rather than waiting for these relations to improve on their own, however, experts have suggested interim, concerted efforts focused on reassurance.

Zia Mian and physicist A.H. Nayyar, both members of the IPFM, point out that “Along with the Group of 21, countries such as Brazil, Japan, and New Zealand [non-nuclear weapon states]...should assure Pakistan that they will work together with Islamabad in insisting that the treaty cover fissile material stockpiles in an effective way.”⁸⁶

Einhorn has recommended that, at least for an interim step as part of his proposed Fissile Material Control Initiative focused on the P5, the United States should offer “credible assurances” that its ballistic missile defense systems “are not intended to undercut China’s deterrent” which “could help get Beijing on board”.⁸⁷

Analyst Andrea Berger notes the apparent increase in action among the P5 on the FM(C)T, and even possibly with India, Pakistan, and Israel. She cites the formal statement by the United States in October 2012: ‘A year ago the United States initiated consultations among the P5 and others on unblocking FMCT negotiations in the CD, and to prepare our own countries for what we expect would be a challenging negotiation.’⁸⁸ Berger acknowledges the closed nature of the P5 forum, which may be more conducive to their willingness to meet and discuss sensitive issues. On the other hand, Berger suggests that the “international community should also express a desire for periodic P5 statements on the FMCT.”⁸⁹

Also focusing on the P5, international security scholar Andrew Cottey⁹⁰ has made a series of recommendations that include more gradual steps that would allow space for reassurance – making the members more comfortable with increasingly transparent measures, which could prepare the way for more verification agreements for the P5. He suggests that the aim of increasing transparency should eventually move outward to include the other nuclear weapons states outside of the NPT, but that this goal should be put aside in the short-term as it could harm the initial process.⁹¹ Cottey points to the utility of “informal reciprocity: steps would be predicated on the

⁸⁶ Mian, Z. and A.H. Nayyar, “Playing the Nuclear Game: Pakistan and the Fissile Material Cutoff Treaty”, *Arms Control Today*, April 2010.

⁸⁷ Einhorn, R. 2008, p. 4.

⁸⁸ Berger, A. “The P-5 Plus Talks and Prospects for Progress on a Fissile Material Cut-Off,” European Leadership Network website, January 9, 2013.

⁸⁹ Berger, A., 2013.

⁹⁰ Dr. Andrew Cottey currently serves on the Board of the British American Security Information Council (BASIC).

⁹¹ Cottey, A. “Multilateralizing Nuclear Arms Control: An Agenda for the P5”, British American Security Information Council, June 28, 2011, p. 2.

assumption of reciprocity amongst the five states, but no formal agreement or specific quid pro quos would be required. Initial small steps would hopefully lead to further more substantial measures".⁹²

Conclusion

The literature mentioned above provides descriptions of the vested interests, hurdles, and opportunities around an FM(C)T, with some recommendations for managing the most difficult problems. Despite the amount of political capital and technical expertise invested, the seemingly intractable nature of reaching agreement on an FM(C)T makes un-jamming the process a challenge. At a minimum, the literature tends to show that some steps might be done in tandem, while other steps would need to come before others to help build confidence.

The literature also makes clear that negotiations will not advance if leaders look ahead and presume that the outcome will result in a net loss of security for their states. The political efforts, and any technical aspects that they emphasize, will need to manage these doubts along the way, and emphasize that the FM(C)T agreement they are working toward will ultimately be in the interests of all states. The forthcoming Group of Governmental Experts (GGE) process may provide opportunities to unlock some of the seemingly intractable issues which continue to hinder progress on an FM(C)T. BASIC facilitated a private roundtable discussion with experts on March 8, 2013 to consider how the GGE might best stimulate progress. A summary of key points discussed is available on the BASIC website: www.basicint.org

⁹² Cottey, A. 2011, p. 11.

Appendix I: Acronyms

CD: Conference on Disarmament

CTBT: Comprehensive Test-Ban Treaty

FMCI: Fissile Material Control Initiative

FM(C)T: Fissile Material (Cutoff) Treaty

GGE: Group of Governmental Experts

HEU: Highly Enriched Uranium

IAEA: International Atomic Energy Agency

ICNND: International Commission on Nuclear Non-Proliferation and Disarmament

IPFM: International Panel on Fissile Materials

LEU: Low-Enriched Uranium

NSA: Negative Security Assurance

NPDI: Non-Proliferation and Disarmament Initiative

NPT: Treaty on the Non-Proliferation of Nuclear Weapons

NWS: Nuclear Weapon States

NNWS: Non-Nuclear Weapon States

OEWG: Open-Ended Working Group

PAROS: Prevention of an Arms Race in Outer Space

P5: Five permanent members of the U.N. Security Council

P6: Six President's Initiative

Appendix II: Table on FMCT Definitions from 2011 Experts Side Event, organized by Australia and Japan*

Australia-Japan Experts Side Event on FMCT Definitions, Palais des Nations, Geneva, February 14-16, 2011

Participants at the experts' side event on FMCT definitions "offered or spoke to four broad options for the definition for "fissile material" and "production" subject to an FMCT". As noted on page 5 of the Chair's report, these options are "not exhaustive".

Definition	"Fissile Material"	"Production" (where specified)
1. "Skotnikov-A" ¹	High enriched uranium (HEU) above 90% enrichment and plutonium with more than 90% Pu-239.	U-235 production = enrichment $\geq 90\%$.
2. CD/1771	Plutonium with more than 70% Pu-239; HEU containing more than 40% of U-235; as well as U-233 and neptunium.	U-235 production = enrichment $\geq 40\%$; Pu production = irradiation only where Pu-239 content is $\geq 70\%$, otherwise separation.
3.	"Unirradiated direct-use material" ²	U-235 production = enrichment $\geq 20\%$; Pu production = reprocessing; U-233 production = reprocessing.
4.	"Special fissionable material, plus neptunium" ³	U-235 production = enrichment $\geq 0.7\%$; Pu production = irradiation; U-233 production = irradiation; Np-237 production = irradiation.

Also noted in the Chair's report (page 6): "Some proponents of definition 3 in the table directly above offered variations on that definition. These variations can be summarised as in the following table. The primary variations were whether the fissile material subject to an FMCT might include neptunium and americium and whether production subject to an FMCT might include enrichment of plutonium-239 by isotopic separation".

* Excerpt from: Report of the Chair, Ambassador Peter Woolcott of Australia CD/1906, pp. 5-7, available on the U.N. Office at Geneva's website.

Variations on definition 3 – “unirradiated direct-use material”

Variation	“Fissile material” by isotopic quality	Production
CD/1777	<p>(a) Plutonium except plutonium whose isotopic composition includes 80 percent or greater plutonium-238.</p> <p>(b) Uranium containing a 20 percent or greater enrichment in the isotopes uranium-233 or uranium-235, separately or in combination; or</p> <p>(c) Any material that contains the material defined in (a) or (b) above.</p>	<p>(a) separating any fissile material from fission products in irradiated nuclear material;</p> <p>(b) enriching plutonium-239 in plutonium by any isotopic separation process;</p> <p>(c) enriching uranium-233 or uranium-235 in uranium to an enrichment of 20 percent or greater in those isotopes, separately or in combination, by any isotopic separation process.</p>
CD/1895	<p>(a) HEU, i.e. uranium enriched to 20% or more in the isotope U-235;</p> <p>(b) Separated (unirradiated) plutonium containing less than 80% of the isotope Pu-238;</p> <p>(c) Separated Uranium-233;</p> <p>(d) (Possibly) separated neptunium;</p> <p>(e) (Possibly) separated americium.</p>	<p>U-235 production = enrichment $\geq 20\%$;</p> <p>Pu production = reprocessing;</p> <p>U-233 production = reprocessing;</p> <p>Np-237 production = reprocessing;</p> <p>Am-241 production = reprocessing.</p>
Variation 3	<p>(a) Plutonium 239, uranium enriched to 20% or greater in the isotopes uranium-233 or uranium-235, separately or in combination;</p> <p>(b) Any material containing the material defined in a) above, except plutonium containing 80% or greater in the isotope plutonium 238.</p>	<p>(a) separating any fissile material from fission products in irradiated nuclear material;</p> <p>(b) enriching plutonium in plutonium-239 by an isotopic separation process;</p> <p>(c) enriching uranium-233 or uranium-235 to an enrichment of 20% or greater in those isotopes, separately or in combination, by any isotopic separation process.</p>
Variation 4	<p>Neptunium-237, plutonium-239; plutonium mixtures, uranium-233; uranium enriched in the isotopes 235 with the following exceptions:</p> <p>(a) uranium enriched in the isotopes 235 with concentrations less than 20%;</p> <p>(b) plutonium mixtures with Pu-238 concentrations equal or more than 80%;</p> <p>(c) fissile materials mixed with fission products (irradiated).</p>	<p>The enrichment of uranium in U-235; the separation of plutonium and/or Np-237 from irradiated uranium; the separation of U-233 from irradiated thorium and the conversion of fissile material into weapon usable form.</p>

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