

An hourglass-shaped graphic with a globe of the Earth inside. The top bulb is dark blue, and the bottom bulb is light blue. The globe is centered in the narrow neck of the hourglass. The top bulb has a dark blue cap, and the bottom bulb has a light blue cap.

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*Banning Fissile Material Production for Nuclear Weapons:  
Prospects for a Treaty (FMCT)*

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## Banning Fissile Material Production for Nuclear Weapons: Prospects for a Treaty (FMCT)

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### Summary

On May 18, 2006, the United States proposed a draft Fissile Material Cutoff Treaty (FMCT) at the Conference on Disarmament (CD) in Geneva. The U.S. draft treaty, would enter into force with only the five established nuclear weapon states. It would ban new production of plutonium and highly enriched uranium for use in nuclear weapons for 15 years; could be extended only by consensus of the parties; would allow high-enriched uranium production for naval fuel; and contains no provisions for verification other than national technical means. The next step is for the CD to adopt a negotiating mandate, the prospects for which appear uncertain, given continued linkage by some states of FMCT negotiations with other disarmament talks. The CD meets again from July 31 to September 15. This report will be updated as necessary.

### Background

Efforts to control the production of fissile material for nuclear weapons date back to the 1946 Baruch Plan.<sup>1</sup> As Cold War enmities solidified, however, attempts to control fissile material production for weapons were abandoned. “Cutoff” negotiations in Geneva got a boost from President George H.W. Bush’s announcement in 1992 that the United States no longer produced fissile material for nuclear weapons and President Clinton’s 1993 call for Fissile Material Cutoff Treaty (FMCT) negotiations. Despite consensus on a negotiating mandate, member states at the Conference on Disarmament (CD) failed to start negotiations.

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<sup>1</sup> The Baruch plan called for “complete managerial control of the production of fissionable materials,” after which manufacture of atomic bombs could stop. Reprinted in *Nuclear Proliferation Factbook*, Joint Committee Print, 99<sup>th</sup> Congress, 1<sup>st</sup> Session, August 1985.

Some perceive a ban on producing fissile material for weapons as much more relevant today than it was a decade ago, a view supported by the Bush Administration's May 18, 2006, proposal. Concern about terrorist access to large stockpiles of fissile material has only grown since the Cooperative Threat Reduction programs began in the early 1990s and particularly since September 11, 2001. Revelations about Pakistani scientist A.Q. Khan's nuclear black market sales of uranium enrichment technology in 2004 have spurred efforts not only to shut down networks, but restrict even "legitimate" technology transfer. Recent proposals to strengthen the nonproliferation regime, including those of Mohamed ElBaradei, Director General of the International Atomic Energy Agency (IAEA), have focused on tighter controls on sensitive nuclear fuel cycle technologies, renewed disarmament effort, and creative approaches toward states outside the Nuclear Nonproliferation Treaty (NPT) — India, Pakistan, and Israel.<sup>2</sup> An FMCT could play a pivotal role in implementing that agenda, by helping to gain broad support for new multilateral arrangements to restrict enrichment and reprocessing, helping to strengthen consensus among NPT parties, and by achieving a concrete step towards disarmament. Lastly, an FMCT is viewed by many nonproliferation experts as the *sine qua non* for nuclear cooperation with India. At a minimum, President Bush has proposed to make Indian support for FMCT negotiations a prerequisite for engaging in nuclear cooperation.

## Fissile Material

Most nonproliferation experts consider acquiring fissile material to be the key hurdle in developing nuclear weapons. Such material — plutonium-239, uranium-233, and uranium enriched in the isotope U-235 — is produced several ways.<sup>3</sup> Only the isotope U-235 occurs naturally, but it cannot be used to create a nuclear yield unless it is concentrated significantly.<sup>4</sup> Pu-239 is created in a nuclear reactor by irradiating natural uranium (U-238), which absorbs a neutron to decay into Pu-239.<sup>5</sup> The Pu-239 must then be chemically separated from highly radioactive fission products to be usable in a nuclear weapon.<sup>6</sup> Spent fuel reprocessing plants perform this chemical separation, but it can also be done on a smaller scale, with remote handling and adequate shielding against radiation hazards. U-233 is produced in a reactor by irradiating thorium-232, and also requires chemical separation from fission products. High-enriched uranium (HEU), the ingredient in the first U.S. nuclear bomb, is produced by concentrating the isotope U-235 in an enrichment plant.<sup>7</sup> Although HEU is defined as containing 20% or more U-235, weapons-grade HEU generally requires about 90% U-235.

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<sup>2</sup> Mohamed ElBaradei, "Rethinking Nuclear Safeguards," *Washington Post*, June 14, 2006.

<sup>3</sup> The U.S. May 2006 proposal does not limit plutonium to just Pu-239, but extends it to all plutonium except that which contains 80% of Pu-238.

<sup>4</sup> Natural uranium contains mostly U-238, with very little U-235 (less than 0.7%).

<sup>5</sup> Plutonium is "created" in a reactor, but banning such creation could virtually eliminate civil uses of nuclear energy. Moreover, plutonium in spent fuel cannot produce a nuclear yield unless separated from waste products and therefore "production" tends to be equated with reprocessing.

<sup>6</sup> The discussion here is limited to nuclear weapons with nuclear yields and excludes radiological weapons, which simply use radioactive material to contaminate conventional explosives.

<sup>7</sup> Technologies include gaseous diffusion, electromagnetic isotope separation, laser isotope separation and gas centrifuge isotope separation (which Iran is developing).

## Which States “Produce” Fissile Material for Weapons?

Nine states have produced fissile material for nuclear weapons — the five nuclear weapon states as defined by the NPT (United States, United Kingdom, Russia, France, and China), India, Pakistan, Israel, and North Korea. All of these states have unsafeguarded — that is, uninspected — enrichment and reprocessing plants, but four are no longer producing fissile material for weapons — United States, United Kingdom, Russia, and France.<sup>8</sup> The United States stopped producing HEU for weapons in 1964 and plutonium for weapons in 1988. Russia and the United Kingdom declared their cessation in 1995; France declared a halt in 1996.<sup>9</sup> China is believed to have halted production, but has not publicly declared so. It is not clear that Israel or North Korea enrich uranium for weapons, and India’s enrichment plant reportedly is used to enrich uranium for naval submarine fuel. North Korea’s relevance in FMCT negotiations is controversial, since there would be great pressure to place its enrichment and reprocessing plants under IAEA safeguards by a return to the NPT, rather than as a party to an FMCT. Other non-nuclear weapon state parties to the NPT reprocess spent fuel (Japan) and enrich uranium (Netherlands, Germany, Argentina, Brazil, Japan) for commercial purposes. These capabilities are under IAEA safeguards, which verify that nuclear material is not diverted.

Some states have argued that a treaty should cover existing stocks of fissile material. The United States has long opposed this approach. The dissolution of the Soviet Union, and more recently, the September 11, 2001, attacks, have heightened concerns about terrorist access to weapons of mass destruction materials, bolstering the argument to include existing stocks in an FMCT. According to 2004 estimates, there are more than 3,700 metric tons of plutonium (1,800 tons) and highly enriched uranium (1,900 tons) in the world. Much of the plutonium is in civilian reactors or spent fuel ponds, is safeguarded, and not separated from fission products, and thus poses a lower security risk. About 235 tons of plutonium in the civil cycle is separated from fission products already. Military plutonium accounts for just 1/10th of the civilian plutonium, but about 90% of it is separated. An estimated 1,570 tons of the world’s plutonium are under safeguards, while 155 tons are in military stocks in the five nuclear weapon states.<sup>10</sup> The situation for HEU is reversed, with 50 tons under safeguards in civilian programs, 125 tons declared by the United States is excess to defense needs (and therefore eligible to be safeguarded), and 1,725 tons in military programs.<sup>11</sup>

Given that four of the five nuclear weapon states have declared they have ceased production, and Russia, the United States and the United Kingdom have declared material

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<sup>8</sup> The NPT requires non-nuclear weapon states to accept a system of inspections and record-keeping — nuclear safeguards — on all nuclear material in all peaceful nuclear activities. The nuclear weapon states under the treaty — U.S., U.K., China, France and Russia — are not obliged to accept any nuclear safeguards, but have voluntary safeguards on some civilian facilities.

<sup>9</sup> See David Albright, *Global Fissile Material Inventories*, available at [<http://www.isis-online.org>].

<sup>10</sup> See [[http://www.isis-online.org/global\\_stocks/plutonium\\_watch2004.html#table3](http://www.isis-online.org/global_stocks/plutonium_watch2004.html#table3)].

<sup>11</sup> See [[http://www.isis-online.org/global\\_stocks/end2003/civil\\_heu\\_watch2005.pdf](http://www.isis-online.org/global_stocks/end2003/civil_heu_watch2005.pdf)].

in excess of defense needs, what remaining barriers exist to including existing stocks in a treaty? Covering existing stocks in a cutoff treaty could prove highly contentious because: (1) The stockpiles of the five weapon states range from 4 tons to 145 tons and are significantly larger than those of India, Pakistan, and Israel; (2) It is unclear whether a commitment would be mandatory or voluntary; and (3) It is unclear whether the parties could agree on equitable cuts.

## FMCT at the Conference on Disarmament (CD)

In response to U.N. General Assembly Resolution 48/75L, the CD established a committee in 1995 to begin work on an FMCT. The 66-member negotiating body in Geneva agreed by consensus to the so-called “Shannon Mandate,” which called for an “Ad Hoc Committee to negotiate a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices.” Canada’s Ambassador Shannon specifically noted that the mandate did not preclude any delegation from raising issues related to the scope of the treaty — whether banning future production, covering existing stocks, or adding management of stocks — during discussions.

Following the conclusion of Comprehensive Test Ban Treaty negotiations in 1996, FMCT appeared to be the next priority, yet CD member states could not agree on a program of work. In late 1998, CD members agreed to establish an Ad Hoc Committee, mostly in reaction to the Indian and Pakistani nuclear tests earlier that year, but the CD was unable to reestablish the Committee in 1999. Within the CD, four basic areas of work — nuclear disarmament, prevention of an arms race in outer space (PAROS), negative security assurances, and a fissile material production cutoff — still compete for priority. Moreover, several states prefer to link progress in one area to progress in another area, which some observers call “hostage-taking.” China, for one, has made its agreement to start FMCT negotiations contingent on the start of PAROS negotiations, and other states have done the same with respect to nuclear disarmament negotiations.<sup>12</sup> In May 2006, the U.S. delegation told CD members it “sees no need at this time, however, for the negotiation of new multilateral agreements on nuclear disarmament, outer space, or negative security assurances.”<sup>13</sup> In June 2006, a U.S. official told the CD that “...there is no — repeat, no — problem in outer space for arms control to solve.”<sup>14</sup>

<sup>12</sup> See [<http://www.reachingcriticalwill.org/political/cd/speeches06/8juneIndia.pdf>] for Indian June 2006 position and [<http://www.reachingcriticalwill.org/political/cd/speeches06/8JuneChina.pdf>] for China’s position. The United States and United Kingdom have opposed PAROS negotiations, despite the existence of an Ad Hoc Committee on PAROS at the CD from 1985 to 1994.

<sup>13</sup> Stephen G. Rademaker, Acting Assistant Secretary for International Security and Nonproliferation, “Rising to the Challenge of Effective Multilateralism,” at [<http://www.state.gov/t/isn/rls/rm/66419.htm>].

<sup>14</sup> See [<http://www.reachingcriticalwill.org/political/cd/speeches06/13JuneUS.pdf>].

## Major FMCT Issues

Although negotiations have been stalled for more than a decade, the CD has convened informal meetings to examine issues of FMCT scope, duration, and verification, and entry-into-force.<sup>15</sup> Several issues could generate debate, but are likely to be fairly non-controversial, including how to define fissile material (all plutonium except reactor-grade, or just Pu-239?) and production (in a reactor or in a reprocessing plant?), and provisions for entry into force and duration. The most difficult issues to resolve are likely to be whether the scope should include existing stocks, what kinds of activities would not be prohibited, and whether verification measures are necessary and if so, what kind. Until 2004, when the United States announced that an FMCT was inherently unverifiable, many observers assumed IAEA safeguards would play a role, with modifications made for inspections in nuclear weapon states. The U.S. position may not be accepted by a significant number of CD members.

## U.S. Proposal

On May 18, 2006, the U.S. delegation to the CD proposed a draft negotiating mandate and FMCT text. The negotiating mandate excludes reference to effective verifiability of a treaty, in line with the U.S. position that an FMCT cannot be adequately verified. The proposal seeks to prohibit the production of “fissile material for use in nuclear weapons or other nuclear explosive devices, or use of any fissile material produced thereafter in nuclear weapons or other nuclear explosive devices.”<sup>16</sup> Key elements of the U.S. draft include a 15-year duration, which could only be extended by consensus of the parties; a scope limited to future production, with an exception for production of naval fuel; an entry-into-force provision limited to the five nuclear weapon states; and no provisions for verification. U.S. officials have stated that verification would “rest with the parties using their own national means and methods.”<sup>17</sup>

The U.S. proposal raises a few issues. Requiring consensus to extend the treaty may present a very high threshold. Also, the requirement for the treaty to enter into force with just the five nuclear weapon states, rather than all states with unsafeguarded enrichment and reprocessing plants, may mean that key states that are producing fissile material may be left out — India, Israel, and Pakistan. This would reduce the effect to merely making the status quo (if it is true that China has stopped producing) legally binding for a limited duration. However, it is also possible that other NPT nuclear weapon states could refuse to ratify until India or Pakistan did. Third, allowing production of HEU for naval reactors creates a particular loophole in the absence of verification measures. Some states could produce HEU for weapons, unfettered even by declarations. Finally, one of the few areas of agreement among states in the 1995 negotiating mandate was the need for effective verification, so some may view the U.S. approach as undermining what little agreement had been reached.

<sup>15</sup> These include workshops in 1995, 1999, 2001, 2002, 2004, and 2006.

<sup>16</sup> See [<http://geneva.usmission.gov/Press2006/0518DraftFMCT.html>] for the U.S. draft FMCT.

<sup>17</sup> Ibid. Such national means generally are limited to remote monitoring, including from satellites.

No state has opposed FMCT negotiations, but China has repeated its desire to reach “a comprehensive and balanced program of work.” India’s ambassador to the CD reported on May 17, 2006, that India supported verification in the FMCT, and that “absence of a verification mechanism may engender lack of confidence in compliance, with the treaty, encourage willful non-compliance, and lead to allegations and counter-allegations of noncompliance.”<sup>18</sup> Pakistan’s ambassador to the CD quipped that a fissile material treaty “*sans* verification *sans* stocks will be *sans* treaty.”<sup>19</sup>

## Issues for Congress

Congress may be interested in the progress of FMCT negotiations in the context of India’s July 18, 2005, commitment to work with the United States to conclude a multilateral FMCT. India’s support for FMCT is one of the key determinations the President must make, according to the Administration’s proposed legislation on U.S.-India nuclear cooperation (H.R. 4974/S. 2429).<sup>20</sup> It is not clear if Indian support for a verifiable FMCT conflicts with support for U.S. efforts, but this position could raise questions about how hard India will work to achieve U.S. goals in the CD.

The Senate would have the opportunity to advise and consent to U.S. ratification of an FMCT. Should the CD adopt the U.S. approach, several questions may arise:

- Given historic difficulties in estimating fissile material production, can U.S. intelligence capabilities provide confidence in a global ban, particularly with respect to China? How difficult is it to distinguish between “allowed” enrichment for naval fuel and illicit enrichment for nuclear weapons?
- If the treaty enters into force with just the five nuclear weapon states, will it satisfy nonproliferation objectives?
- Will key states such as Pakistan, India, China, and Israel agree to national technical means as the only verification approach?

<sup>18</sup> See [<http://www.reachingcriticalwill.org/political/cd/speeches06/17MayIndia.pdf>].

<sup>19</sup> See [<http://www.reachingcriticalwill.org/political/cd/speeches06/statements%2016%20may/16MayPakistan.pdf>].

<sup>20</sup> See CRS Report RL33016, *U.S. Nuclear Cooperation with India: Issues for Congress*, by Sharon Squassoni. Both the House and Senate committee mark-ups of India legislation contain the Administration’s language on the FMCT determination.