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INTERNATIONAL PANEL  
ON FISSILE MATERIALS

Banning the Production of  
Fissile Materials for Nuclear Weapons:

# Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty

Companion Volume to Global Fissile Material Report 2008

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# **Banning the Production of Fissile Materials for Nuclear Weapons: Country Perspectives on the Challenges to a Fissile Material (Cutoff) Treaty**

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**On the cover:** the map shows existing and planned uranium enrichment and plutonium separation (reprocessing) facilities around the world.

# China

During the past decade, several arms control negotiations have been proposed at the Conference on Disarmament (CD), including most prominently a Fissile Material (Cut-off) Treaty, or FM(C)T, banning the production of fissile materials for weapons; a treaty for the Prevention of an Arms Race in Outer Space (PAROS); a treaty on “negative security assurances” against threats or use of nuclear weapons against non-weapon-state Parties to the NPT; and a treaty on nuclear disarmament. Different groups of countries have very different preferences concerning these negotiations and no consensus has been reached on a mandate for any negotiation. China has pushed very hard for negotiations on PAROS, is very cautious about FM(C)T, and echoes other CD members on negotiations of negative security assurances and on nuclear disarmament. This paper discusses China’s position on an FM(C)T from the perspective of cost-benefit analysis.

## **How Much Is Enough?**

A key question in the FM(C)T cost-benefit calculation is whether or not China’s current fissile-material stocks are sufficient to meet its future weapons needs. China’s fissile materials usable for weapons include both weapon-grade plutonium and weapon-grade highly enriched uranium. Recent non-governmental estimates of China’s stocks of weapon-grade uranium range from 17 to 26 tons and of its plutonium from 2.3 to 3.2 tons.<sup>1</sup> These estimates are based on very limited publicly available information about the capacities and histories of China’s fissile-material production facilities and the quoted uncertainties in the estimates appear smaller than the uncertainties in the input data would suggest.

China has reported very little on its fissile material production, and information on possible work stoppages, losses and inefficiency is not public. The non-governmental estimates may therefore be high.

China’s weapon-grade plutonium has only one use, the production of pits for nuclear warheads. Two tons of plutonium could be used to produce up to about 500 warhead pits. If the amount of China’s weapon grade plutonium is somewhat less, the number of nuclear warhead pits that could be produced would be correspondingly fewer.

Twenty tons of weapon-grade uranium could produce up to another one thousand warhead pits. However, China’s weapon-grade uranium has other potential uses: in the secondaries of thermonuclear warheads and in the fuel of nuclear-submarine and research reactors. These diverse uses of weapon-grade uranium reduce the maximum number of warhead pits China could potentially produce.

According to the most recent estimates published in the NRDC nuclear notebook, China has about 240 nuclear warheads with 176 deployed.<sup>2</sup> This number has been relatively stable in recent years although China could produce many more if it wished. This suggests that China feels comfortable with and confident with such a small nuclear force in today's security environment. Assuming that: (1) China has to reserve all its weapon-grade uranium for other purposes than producing nuclear warhead pits; (2) all China's weapon-grade plutonium stockpile is available for producing nuclear warhead pits; and (3) the real amount of China's weapon-grade plutonium is somewhat smaller than the publicly estimated 2–3 tons, we can conclude that China's weapon grade fissile stockpiles can support a nuclear force of a few hundred nuclear warheads. If, however, China's actual stockpile of weapon-grade plutonium is considerably less, its security experts may not be able to assure to China's decision makers that its weapon grade fissile stockpiles can meet all possible future weapon needs. This could explain China's cautious and reluctant positions on an FM(C)T during the past decade.

Three factors could affect China's perceived requirements for nuclear warheads and therefore weapon-grade fissile materials. These three factors are changes in: nuclear doctrine, the international security environment, and military technology.

China's leaders fully understand the constraints of the nuclear taboo against the use of nuclear weapons and therefore regard nuclear weapons as a "paper tiger." The purpose of Chinese nuclear weapons is to counter possible nuclear coercion by other nuclear weapon states. For this purpose, China does not need a large number of nuclear weapons or weapons that are kept launch ready.<sup>3</sup>

According to public reports, China's production of fissile material for weapons stopped in the early 1990s when its economy began to take off.<sup>4</sup> This suggests that it was a political decision rather than economic constraints that led to a production halt, i.e., China's leaders felt that the Chinese did not need more than a relatively small nuclear force at the time.

There is no evidence that China's emphasis on nuclear weapons has increased since. China has repeatedly reconfirmed its no-first-use commitment.<sup>5</sup> China's nuclear weapons are reportedly still off alert and its single ballistic-missile submarine has reportedly never conducted a deterrent patrol.<sup>6</sup> Although China is developing land-based mobile missiles and perhaps new submarines and submarine-launched ballistic missiles to raise the survivability of its nuclear weapons, it can recycle the fissile materials in old warheads on weapon systems being retired into the warheads for the replacement systems. At present, it appears that any net growth in China's stockpile of warheads is not large enough to require the production of more fissile material.

Also at present, China's overall international security environment remains favorable.<sup>7</sup> China's relations with all other nuclear weapon states are much better than at the time when China first developed its nuclear weapons. Nuclear weapons are no longer a major factor in China's relations with the other four NPT nuclear weapon states: the United States, Russia, France and the United Kingdom; or with its new nuclear neighbors: India, Pakistan and North Korea. China does not need a large nuclear force to deal with these countries. A small nuclear retaliatory capability should be enough to counter any attempts at nuclear coercion.

Possible revolutions in military technology are the major sources of uncertainty in calculating China's future needs for nuclear weapons. If the technologies of missile defense and of conventional strategic offensive weapons become mature and effective,

China may need more nuclear weapons to offset the losses from a possible conventional first strike against its nuclear forces and then to be able to saturate the attacker's missile defense with its surviving force.

It seems that both conventional strategic offensive weapons and missile defenses still lack the capabilities to identify real targets among decoys and therefore their effectiveness remains a big question.

China's decision makers are unwilling to rule out the possibility, however, that, if the United States continues to invest heavily in these capabilities in the future, some technical breakthrough may fix the discrimination problems of conventional strategic offensive systems and missile defense. A safe strategy for China to hedge against unfavorable technical developments is therefore to reserve the option of expanding its nuclear force as a last resort. As its current fissile stockpiles might only marginally meet China's needs for its existing small nuclear force, it might then have to produce new fissile materials. This uncertainty about future needs is a central question in China's FM(C)T calculations.

### **Relative Security Gains**

An arms control agreement brings security benefits to its state parties by putting constraints on the arms developments of the other state parties. This is why states are willing to accept some constraints on themselves. However, the FM(C)T would pose much stronger constraints on China's nuclear capability than on at least some other nuclear weapon states.

Relative to China, the United States and Russia have huge nuclear forces, huge numbers of warheads in reserve, and huge stockpiles of fissile-material. They would not need new fissile materials to build up their warhead stockpiles again. An FM(C)T therefore would place negligible constraints on their nuclear capabilities. Thus, the relative security gain of FM(C)T for China would be much smaller than for other nuclear weapons states.

During the Cold War, China repeatedly complained about the unbalanced gains (or constraints) of arms control treaties. China believed that United States and Soviet Union promoted arms control agreements only when they felt that they no longer needed the options that were foreclosed. Some of these agreements targeted China. The Partial Test ban Treaty and the Threshold Test ban Treaty are two examples.

The end of the Cold War changed this perception in China. The Chemical Weapon Convention (CWC) did not target China as China did not have a chemical arsenal. The CWC was negotiated at the CD largely because the United States took the lead in giving up the option of keeping a retaliatory reserve of chemical weapons.<sup>8</sup> In the early 1990s, therefore, China no longer felt that arms control agreements were targeting China or brought little relative gains to China. This new perception encouraged China to be very active in the negotiations of the Comprehensive Test Ban Treaty (CTBT). Although the timing of the negotiations was bad for China, China was very constructive and cooperative.

After the conclusion of the CTBT, however, the global arms control situation worsened. The United States has been opposing the negotiation of a treaty on Prevention of an Arms Race in Outer Space (PAROS). The United States also withdrew from the ABM treaty, which China believed to be important. The arms control dynamics at the CD and elsewhere revived China's concern over the imbalance of relative gains of arms

control agreements. It is quite obvious that an FM(C)T would pose a stricter constraint on China's nuclear capability than on those of Russia and the United States. China's efforts to launch a PAROS negotiation were rejected by the United States repeatedly, which confirmed China's perception that an FM(C)T might be a relative loss for China among the five nuclear weapon states.

In principle, an FM(C)T would play a role in preventing emerging nuclear states from acquiring more fissile materials. In an FM(C)T negotiation, China would push for its new nuclear neighbors to join the treaty in the same way as it pushed in the CTBT negotiations for the ratifications of these countries as conditions for the Treaty to enter into force. The experience of CTBT raised a big question about the roles of arms control agreements for China, however, as three of its neighbors, India, Pakistan and North Korea, all conducted nuclear explosion tests after the conclusion of the CTBT.

It is not clear how these countries will respond to an FM(C)T. They might simply reject the treaty as they did the CTBT. Or, they might ask for additional rewards in separate deals. For example, North Korea is asking for energy compensation and benefits in the Six Party Talks in exchange for disablement of its plutonium-production complex. China has been paying economically and politically to encourage North Korea to freeze and dismantle its nuclear program. India and the United States are considering a nuclear deal that may help India increase its rate of production of fissile material for weapons. If China encouraged India and Pakistan to stop their fissile material production for weapons, China could pay the price of damaging its political relationships with these countries. Alternatively, if India and Pakistan delayed their accession to the FM(C)T—as currently seems quite possible—its security benefit to China would diminish.

At the same time, an FM(C)T may encourage nuclear weapon states to take more active steps to dispose of excess fissile materials, which would contribute to efforts to combat nuclear terrorism. If the FM(C)T can play this role, it would be a net security gain for all nuclear weapon states, including China.

#### **On-Site Inspections**

The abuse of on-site inspections has long been a concern for China. China worries that other state parties might ask for challenge inspections in China that could reveal sensitive information. This concern is more serious for an FM(C)T than a CTBT. A reasonable on-site inspection under a CTBT would be conducted in a desolate area that would not necessarily have great military significance. An on-site inspection under the FM(C)T would most likely be conducted in industrial facilities that might have military or commercial significance.

To analyze China's attitudes toward FM(C)T on-site inspections, a scenario of verification is assumed here. After the entry into force of the FM(C)T, the state parties would be required to declare their shutdown military fissile production facilities and operational civilian production facilities. The International Atomic Energy Agency (IAEA) would then deploy sensors at both the shutdown military fissile production facilities and at operating civilian production facilities. Routine inspections would be conducted at both categories of sites.

At operational civilian production facilities, routine inspections are to ensure that no civilian fissile material is redirected to weapons production. At shut-down military fissile production facilities, routine inspections are to make sure that there is no new production activity. Besides routine inspections, some challenge inspections may also

be allowed by the treaty to clarify concerns about possible undeclared production of fissile material. State parties or the IAEA could propose a challenge inspection if they suspected undeclared production by another state party. The IAEA would need certain procedures to approve (green light) or to deny (red light) a proposal for such an inspection.

Routine inspections at operational civilian production facilities under an FM(C)T would be similar to the safeguards measures implemented by the IAEA in non-weapon states. Some Chinese civilian nuclear facilities are now under IAEA safeguards, and China has become used to this kind of routine inspection including visits by inspectors and continuous monitoring by on-site sensors. China would feel comfortable with this kind of routine inspection at its civilian production sites if it was part of an FM(C)T verification system.

China does not want the FM(C)T to include declarations of the sizes of existing fissile stockpiles. This may also be the position of the other nuclear weapon states. Even routine inspections at shutdown military fissile-material production facilities therefore might be worrisome to China if it believed that the inspections could reveal sensitive information about the quantity or isotopic composition of the fissile materials in China's nuclear weapons.

Technically, sensors deployed at the shutdown military fissile-material production facilities could be designed not to reveal such information. For example, the sensors could be limited only to optical cameras, seismic sensors and electrical meters. Optical cameras would be used to detect human activities, seismic sensors to detect movements of heavy trucks, and electrical meters to detect the supply of power to key items of equipment. None of these sensors could detect nuclear radiation and provide information about the quantity and isotopic composition of fissile materials produced there in the past. Similar limits could be put on the equipment carried by the inspection team on routine visits. But the inspectors could easily take dust samples by wiping facility surfaces at the inspected site, even if they did not carry any complicated equipment. It would be difficult to stop them from taking dust samples and bringing them back for analysis. The dust samples could possibly contain information about the production history and the composition of the fissile materials, which China would not want revealed. This could become a difficult problem in the FM(C)T negotiations.

China also will be concerned with the procedures to be adopted in connection with challenge inspections under an FM(C)T. These procedures would cover: (1) the kinds of information that could be used as a basis for an accusation of a clandestine violation; (2) the basis for accepting or rejecting a challenge inspection; and (3) how sensitive information irrelevant to the treaty would be protected.

China always feels uncomfortable if human intelligence is used as the basis of an accusation of a clandestine violation. Unlike information gained by most remote-sensing technologies, state parties that make accusation on the basis of human intelligence are unwilling to provide the sources of their information. This creates an opportunity for the abuse of on-site inspections. If the information gained by human intelligence cannot be excluded from the basis for a decision to trigger a challenge inspection, China would want a high threshold, for example, a large majority vote of the treaty parties for authorizing an inspection. China would also like additional measures that would help protect sensitive information irrelevant to the treaty, for example, managed access during the inspection.<sup>9</sup>

The recent history of on-site inspections in arms control verification may encourage China to be more receptive to such inspections. To date, there has not been a single challenge inspection conducted under the Chemical Weapon Convention (CWC), even though the threshold of triggering an inspection under CWC is very low. This suggests that the international community is developing a serious and cautious culture with regard to on-site inspections, and that abuses of challenge inspection are not likely. China's chemical industry has become accustomed to CWC routine inspections. This experience may make China's security experts more willing to accept on-site inspections.

#### **Beyond Costs and Benefits**

We have discussed the direct security costs and benefits an FM(C)T could bring to China. But the debates over an FM(C)T in China would certainly go beyond such direct calculations. One reason is that the uncertainties in direct cost-benefit calculations affect the reliability of the conclusions. Another is that China's leaders will certainly take the larger political and economic context into account.

The uncertainties on some FM(C)T considerations are so large that they may lead to very different conclusions. One example is the abuse of on-site inspections. In the negotiation of the Chemical Weapon Convention, the United States pushed very hard for an easy trigger for challenge on-site inspections. In the event, however, things went in the opposite direction.

When the United States Senate ratified the Chemical Weapon Convention, it added reservations that would constrain challenge inspections, although reservations are not technically allowed by the treaty.<sup>10</sup> This suggests that the United States may not after all like the easy trigger for on-site inspections that it appeared to support initially. Also, the relatively easy trigger in the CWC has not encouraged the abuse of on-site inspection in CWC implementation. China now feels quite comfortable with CWC verification.

Some uncertainties about FM(C)T on-site inspections are technical in nature and therefore could be clarified by technical approaches. For example, dust samples collected at old military fissile production sites may not be able to provide more accurate information about the amount and composition of fissile materials produced at the sites in the past than other technical approaches. Or it may be concluded that the information provided by dust samples is not so sensitive after all. A careful study could help clarify this question.

Some uncertainties lie in the dynamics of interactions among countries about arms control and are difficult to predict. For example, other nuclear weapon states may or may not share China's worries about possible abuse of on-site inspections. If they do, they may support a strictly controlled mechanism for on-site inspections, for example, by adding well-designed access management to protect sensitive information irrelevant to the treaty. The CWC experience suggests that the United States and some other countries would not appreciate a culture of frequent and intrusive challenge inspections. China does not have confidence, however, in the stability of the U.S. position on this issue.

The answer to the question, "how much is enough," also has big uncertainties. If, in the future the U.S. Congress limits the budgets for missile defense and strategic conventional offensive weapons as strictly as it has limited programs for designing new nuclear weapons for new missions in recent years, China's concerns about the chance

of technical surprises in these areas will be reduced. Under such circumstances, China would continue to feel comfortable with a small nuclear force and there would be no need to reserve an option for resuming fissile-material production.

These uncertainties do not necessarily suggest that China would oppose an FM(C)T. Instead, the uncertainties add difficulties to FM(C)T decision-making in China and would make every step forward very difficult. Facing large uncertainties in the direct cost-benefit calculations, the decision would have to rely more on the judgment of the Chinese government about the overall arms-control situation and its assessment of its overall national political and economic interests.

If China feels that the overall arms control situation is good and can constrain the future competition in strategic weapons at a low level, it will put more emphasis on the benefits of the FM(C)T and therefore become more supportive of the treaty.

One indicator for China to judge the overall arms control situation would be arms control in space. Even if the FM(C)T negotiations are mandated at the CD without parallel negotiations on other topics, the space issue will continue to be China's central concern. How this is dealt with could change China's confidence in the role of arms control and therefore impact China's approach to the FM(C)T negotiations.

In China, arms control decisions are made on the basis of broader considerations than those of traditional military security.<sup>11</sup> Political, economic, social, and environmental factors also contribute to the comprehensive security of a country. Therefore, arms-control debates in China are always put into the big picture of China's overall political and economic interests. In China today, economic and social development is central and the integration of China's economy into the world is still a general trend. The big picture of national interests suggests that, although it is a difficult topic for China, China would be flexible on the FM(C)T.

### **Conclusion**

The calculation of direct security costs and benefits an FM(C)T could bring to China suggests that it is a difficult topic for China. China worries that an FM(C)T would rule out China's option to respond to unfavorable strategic developments by simply increasing the size of its nuclear force. It also worries about abuse of on-site inspections under an FM(C)T. The direct security calculations have very large error bars so the conclusions may not be very reliable. If the overall arms control situation improves in the future, China will have much higher confidence in its small nuclear force and will become much more supportive of an FM(C)T. One important indicator of the overall arms control situation will be U.S. attitudes toward space arms control. If the United States gives some positive feedback to China's proposals on PAROS, this would significantly affect China's concern over the imbalance of security gains of arms control. China's grand calculation about its total national interests is in favor of arms control in general. This suggests that China could be flexible on the FM(C)T, even though it is a difficult topic for China. If PAROS negotiations go forward together with the FM(C)T negotiations at the CD, China would regain faith in the cooperative nature of arms control and be willing to be flexible in the FM(C)T negotiations.

*Li Bin*

# Endnotes

## Country Perspectives: China

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- <sup>2</sup> Natural Resources Defense Council, "Chinese Nuclear Forces, 2008," *Bulletin of the Atomic Scientists*, July/August 2008, Vol. 62, No. 3. pp. 42–44.
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- <sup>6</sup> Hans Kristensen, "Chinese Submarine Patrols Rebound in 2007, but Remain Limited," [www.fas.org/blog/ssp/2008/01/chinese\\_submarine\\_patrols\\_rebo.php](http://www.fas.org/blog/ssp/2008/01/chinese_submarine_patrols_rebo.php).
- <sup>7</sup> China's Official White Paper in 2006 believes that "China's Overall Security Environment Remains Sound," *China's National Defense in 2006, op. cit.*, p. 6.
- <sup>8</sup> *Fact Sheet: The Chemical Weapons Convention and the OPCW—How They Came About*, Organisation for the Prohibition of Chemical Weapons, [www.opcw.org/docs/fs1.pdf](http://www.opcw.org/docs/fs1.pdf).
- <sup>9</sup> *Global Fissile Material Report 2008*, International Panel on Fissile Materials, Princeton, NJ, September 2008.
- <sup>10</sup> The two most important of these reservations are: 1) If a private organization refuses to voluntarily accept a challenge inspection, the U.S. Executive must obtain a search warrant from a judge; and 2) All samples collected in the United States by inspectors of the Organization for the Prohibition of Chemical Weapons must be analyzed by laboratories located in the United States, "US Chemical Weapons Convention Ratification," *Disarmament Diplomacy*, No. 14, April 1997.
- <sup>11</sup> "China's Position Paper on the New Security Concept," China's working paper submitted to the ARF foreign minister meeting, 31 July 1999, [www.china-embassy.ch/eng/xwss/t138294.htm](http://www.china-embassy.ch/eng/xwss/t138294.htm).

## Country Perspectives: France

- <sup>12</sup> This report is based documents and interviews with officials from the Ministry for Foreign Affairs, Ministry of Defense, and the French delegation to the UN Conference on Disarmament. These departments are rather reticent to communicate on the FMCT and in general on military nuclear activities.
- <sup>13</sup> Robert S. Norris and Hans Kristensen, "French Nuclear Forces, 2005." *Bulletin of the Atomic Scientists*, July/August 2005.

Over the past six decades, our understanding of the nuclear danger has expanded from the threat posed by the vast nuclear arsenals created by the superpowers in the Cold War to encompass the proliferation of nuclear weapons to additional states and now also to terrorist groups. To reduce this danger, it is essential to secure and to sharply reduce all stocks of highly enriched uranium and separated plutonium, the key materials in nuclear weapons, and to limit any further production.

The mission of the IPFM is to advance the technical basis for cooperative international policy initiatives to achieve these goals.

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