

Canberra Commission Issue Paper

Preventing the Weapons Use of Nuclear Energy

**II. Current Political Realities Facing the Transition
to a Nuclear-Weapon-Free World**

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I. Introduction.

A serious international process of nuclear weapons elimination, designed from the outset with the intent of preserving the option of transitioning to a nuclear weapons free world at some future date, must either resolve to modify significantly, or somehow "design around" several major facets of the current international system. Table 1 summarizes some of the salient political realities that appear likely to inhibit the transition to a Nuclear-Weapons-Free World (NWFW).

One of these is the current uneasy co-existence of nuclear fuel-cycle programs inherently capable of producing weapon-usable nuclear materials with a global norm favoring nonproliferation and the ultimate elimination of nuclear weapons. As long as the nuclear weapon states (and their non-weapon state allies) feel secure in their ultimate ability to rely on nuclear weapons to deter "breakout" from the NPT, and the use or threat of use, of nuclear weapons against them, this contradiction in the international security system has apparently proved tolerable, albeit at the cost of a slow growth in the number of states capable of promptly producing nuclear weapons.

However, in the event that a process of deep and continuing nuclear stockpile reductions is established among the weapons states, the contradictions in the current nonproliferation regime may no longer be bridgeable with the current patchwork of discriminatory export controls and technically inadequate safeguards. These and other potential obstacles of a more general political nature are examined below.

**Table 1. Political Realities Confronting the Transition
to a Nuclear Weapon Free World**

- **Plutonium Fuel Cycle Programs** - A number of important countries -- France, Japan, U.K., India, and possibly China -- are likely to remain committed to maintaining and enhancing technical capabilities for pursuing the plutonium fuel cycle, which generates large national stockpiles of separated weapon-usable plutonium, and requires cadres of scientists and technicians with expertise in the same fast neutron physics used in nuclear explosives and in the construction, operation, and maintenance of facilities for plutonium separation and metallurgy.
- **Existing Civil Stocks** - The growing stocks of separated plutonium from these activities represent a likely barrier to the final elimination of the existing stocks of nuclear weapons and weapon components in both declared and undeclared weapon states.
- **HEU Fuel Cycles** - Some of the weapon states may remain committed to the use of weapon-usable Highly-Enriched Uranium (HEU) to fuel nuclear powered submarines and surface ships, and some non-weapon states may seek to preserve the option of developing and deploying advanced thermal power reactor and research reactor that use HEU fuel.
- **Legal "Breakout" Options** - Non-weapon states under the NPT that have "legally" acquired a stockpile of separated plutonium or highly-enriched uranium (or chemical separation or enrichment facilities) under safeguards, but then undergo political upheaval or a change in national strategy, could suddenly emerge as nations bent on building substantial deployed nuclear arsenals.
- **The "Breakdown" Threat** - A process of political disintegration -- such as that experienced by the former USSR and Yugoslavia -- or complete societal breakdown -- like that experienced by several of the nations of sub-Saharan Africa -- could recur in a nuclear industrial state, exposing stores of separated plutonium, fresh plutonium bearing fuel, or highly-enriched uranium to seizure by contending political forces, or sale to organized criminal elements, other governments, and subnational groups.
- **Other Mass Destruction Weapons** - Final elimination of nuclear weapons may well depend on the status of efforts to eliminate *other* weapons of mass destruction, given that the deterrent policies of some states, including the United States, include the potential use of nuclear weapons against states suspected of harboring not only nuclear but also chemical and biological weapon capabilities.
- **The Persistence of "Extended Deterrence"** - In areas of the world in which conventionally-armed deterrence has repeatedly failed to prevent conflict and ensuing losses to national interests and prestige, such as the Middle East, South Asia, and Central Europe, final elimination of nuclear weapons may depend on prior successful implementation of cooperative security arrangements for overcoming longstanding adversarial relations between states.
- **The Penchant for Secrecy** -- Nation states, especially nuclear weapon and threshold states, can be expected to cling to the norms of official secrecy and "plausible denial," particularly regarding their nuclear activities. It is difficult to imagine, for example, how any government remotely like the current Chinese regime would submit to the degree of transparency and circumscribed "national sovereignty" implied by most visions of a NWFV.

II. Civil Stocks of Separated Plutonium and HEU Represent a Likely Barrier to Very Deep Nuclear Reductions and Eventual Elimination.

Absent an international system of far-reaching and intrusive controls -- approximating international ownership and management of all stocks of weapon-usable fissile material -- national stockpiles of separated "civil" plutonium and highly-enriched uranium could act as a barrier to very deep reductions and eventual elimination of nuclear weapons held by declared and undeclared weapon states. The likelihood of this obstacle emerging is immediately apparent if one asks, for example, how far China is likely to go toward eliminating its nuclear arsenal if Japan accumulates an inventory of tens of tons of nuclear explosive materials, in pursuit of a civil plutonium program that has no plausible commercial justification for at least the next 50 years?¹ Ostensibly in keeping with a policy of "minimizing" separated plutonium stocks, at the end of 1994, Japan had 3.8 t of plutonium in the form of nitrate, oxide and fresh fuel in Japan and another 8.7 t of plutonium oxide stored in France and Japan.²

Likewise, how deep will be the cuts in the U.S. nuclear weapons stockpile if Russia proceeds to large-scale deployment of the breeder fuel cycle, with its inventories of hundreds of tons of separated plutonium and inherent capacity for creating "super-grade" blanket material, or if Russia merely continues to accumulate inventories of separated plutonium from operating "civil" reprocessing plants while U.S. military reprocessing plants are shut down?³ The most probable answer is that a significant fraction of the 4900 "active" and 2500 "reserve" U.S. weapons -- and 7,800 stored plutonium pits -- now planned for the year 2003 will stay right where they are.

¹ Recent FAS-NRDC discussions in Beijing with Chinese nuclear weapon designers and security experts reveal a fairly high level of anxiety over Japan's plutonium program.

²Japan Atomic Energy Commission, October 1994, as cited in *Plutonium*, Council for Nuclear Fuel Cycle, Autumn 1995, No. 11, p. 15.

³ Russia already has a surplus of 25 to 30 t of reactor-grade plutonium, separated from predominantly civil sources, in storage. Russia's military and civil nuclear fuel cycle activities are highly integrated, with many facilities co-located at sites with restricted access.

III. The Problem of NPT Breakout Based on Nuclear Capabilities Legally Acquired for Peaceful Uses.

With or without technically adequate safeguards techniques, the reprocessing of spent fuel for "waste management" and the recycling of plutonium⁴ into fresh fuel for thermal power reactors permit non-nuclear weapons states to justify the acquisition and stockpiling of nuclear weapons-usable material -- ostensibly for peaceful purposes. While legally engaged in these nominally peaceful fuel-cycle activities, a country could also secretly design, fabricate, or purchase non-nuclear weapon components. While these actions would violate an implicit but vaguely defined NPT obligation not to engage in "preparations" for "manufacture" of nuclear weapons, *they can be carried out today without violating the terms of international safeguards agreements* currently in force, which are limited to monitoring nuclear material stocks in declared nuclear facilities.⁵

Under current international arrangements, a "non-weapon" state party to the NPT (for example, Japan) is legally entitled to acquire and operate fast-critical assembly for fast-reactor safety studies; develop, acquire, and deploy technologies for producing and separating low-burnup (i.e. weapon-grade) plutonium; and conduct high-explosive experiments for conventional weapons development and industrial research. A number of technical institutes in non-weapons states (e.g. Switzerland, Poland) have sponsored theoretical and experimental work related to the physics of high-explosive and radiation-driven spherical implosions.

By moving to a point of being within weeks, days, or hours of having nuclear weapons -- perhaps needing only to introduce the fissile material into the weapons -- a nascent weapons state would have all of its options open. Under these conditions, international safeguards agreements can actually serve as a cover by concealing the signs of critical change until it is too late for diplomacy to reverse a decision to "go nuclear." In the 1970's a number of countries, including Pakistan, Argentina, Brazil, South Korea, and Taiwan, sought access to reprocessing

⁴ Or any other weapons material, such as highly enriched uranium or uranium-233.

⁵ The IAEA's "93+2" safeguards improvement program is designed to address this deficiency of the current system, but implementation of a number of the most significant proposed upgrades will require further action by the Board of Governors and renegotiation of individual agency safeguards agreements with states.

technology ostensibly for peaceful purposes. *The record shows that at the time these requests were made, each one of these countries also had a secret nuclear weapon development program.*

Likewise, acceptance of the plutonium breeder as a reasonable energy option for the next 50 years provides the justification for the early development of a reprocessing capability by any country. If development of plutonium breeders continues in the few remaining countries that have strong breeder research and development programs, this will continue to legitimize breeder programs and plutonium stockpiles in non-nuclear weapons states that may use these programs to cover the development of a weapons option. *India, for example, recovered the plutonium for its first nuclear device in a reprocessing plant that was ostensibly developed as part of its national breeder program.*

The "once-through" fuel cycle offers substantially greater proliferation resistance by offering no plausible justification for the construction of chemical separation plants and other facilities for recovery and fabrication of plutonium. While a non-nuclear weapon state would always have the option to shift a "peaceful" nuclear program based on the "once-through" fuel cycle to a weapons program, recovery of plutonium would require the politically difficult and risky decision to violate "full-scope" IAEA safeguards by secretly establishing unsafeguarded fuel-cycle facilities.

Fortunately, current international practice by the nuclear suppliers does not conform to the claimed "right" of unhindered access by NPT non-weapon states to all aspects of nuclear energy development for peaceful purposes. However, this contradictory state of affairs leaves the issue of the ultimate legitimacy of sensitive nuclear fuel cycle facilities in a moral and political limbo that works to the long-term disadvantage of the nuclear nonproliferation regime, by fostering both the appearance and reality of "discrimination" while delaying implementation of more effective controls.

Thus, in large measure, the current international safeguards system does not afford the degree of long-term technical and political insurance against proliferation that many policymakers and citizens believe it does. Perhaps the best one can say about the current system, or any enhancements to it likely to be funded and implemented in the current

international climate, is that they can provide unambiguous evidence, and perhaps even timely warning, of any *major effort* to divert nuclear materials or facilities from peaceful uses.

By denying the ongoing "dual-use" of safeguarded civil facilities for weapons production, the current safeguards system plays an important and useful role. But this role by itself is insufficient to protect international security from proliferation threats in the years ahead, and therefore constitutes an insufficient foundation for transition to a NFWF. Given the inherent freedom of parties to withdraw from the NPT, the access to nuclear weapon-usable materials and knowledge legally available to parties under the treaty, and the ability of governments to mount a weapons research program *without overtly violating existing safeguards arrangements, the presumed requirement to engage in large-scale diversion for the development of a nuclear weapons "option" is open to question.* Yet the large-scale diversion scenario is the one that most clearly matches the IAEA's current detection capabilities.

The limited reach of current IAEA safeguards will be remedied, at least in part, by implementation of the IAEA's "93+2" Program of safeguards improvements. This program would increase the transparency of all member-state nuclear programs by obtaining:

- (1) an expanded declaration from States covering all their nuclear-related activities, both present and planned;
- (2) the use of environmental sampling techniques to provide additional assurance regarding the absence of undeclared nuclear activities;
- (3) improved management and analysis of all nuclear related information available to the agency -- using the analytical construct of a proliferation "critical path" -- to highlight at an early stage any information about a State's nuclear activities that may be inconsistent with its declarations to the Agency;
- (4) access beyond currently designated "strategic points" in a safeguarded facility to any location on the site containing the facility;
- (5) access to locations which are not nuclear facilities and do not contain nuclear material, but contain other declared nuclear-related activities; and

(6) prompt access to undeclared locations if the need for such access is indicated by specific information received by the Agency, or is required to implement specific technical monitoring measures.⁶

Unfortunately, an advanced nuclear-industrial NPT non-weapon states such as Japan and Germany, could comply in full with all of these transparency measures and still maintain robust, short-lead time options for the production of nuclear weapons from permitted stocks of weapon-usable materials.

It should be understood and frankly acknowledged by all parties that the risks to international security and the goal of nuclear weapons elimination reside not only in the potential for undetected on-going small diversions of plutonium from "peaceful" programs, but from the fact that fuel-cycle capabilities and separated stocks of weapon-usable material represent an *inherent capacity* for rapid construction of nuclear weapon arsenals. Whether or not a given nation state currently views its plutonium separation or uranium enrichment capacities in this light, the prevailing quasi-anarchy of the international system virtually assures that other states -- and particularly their military establishments -- will perceive a nuclear weapons "hedge" option in the making, and formulate their own future security plans accordingly. If nothing else, the current debate about "counterproliferation" reveals that the U.S. national security establishment, joined by their Russian counterparts and perhaps others, are never likely to view the NPT and its associated safeguards system as a sufficient replacement for preemptive conventional and nuclear strike capabilities against so-called "rogue states" -- that is, those states that might use, or seek coercive advantage from, their own arsenals of mass destruction.

More and better safeguards on plutonium use will not by themselves alleviate this political and strategic problem. In fact, to the extent that "improved" IAEA safeguards for sensitive fuel-cycle facilities actually encourage further development of these capabilities under essentially national control, the result could well be to accentuate the current "negative feed-back loop" between the vision of a future "plutonium economy" and nuclear disarmament efforts.

⁶ These proposed measures are described in detail in "Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System: A Report by the Director General," IAEA Board of Governors, GOV/2784 21 February 1995.

IV. The Threat of "Nuclear Anarchy."

The world must not only consider the possibility of treaty "break-out," but also of societal "break-down," in which stores of separated civil plutonium or highly-enriched uranium could be subject to seizure by contending political or ethnic factions, or to insider theft and sale to organized criminal elements, other governments, and subnational groups. The dangerous vulnerability and repeated thefts of fissile materials in Russia today is a harbinger of what we might expect to occur in a future "plutonium economy," particularly if the present pattern of national programs and weak international controls is extended to cover extensive commercial reprocessing and deployment of breeders.

Since the fall of 1992, at least five serious thefts of weapon-usable material have been intercepted -- three involving HEU quantities of 1.5 to 3 kg, and two others involving plutonium and HEU quantities of several hundred grams. Most, if not all, of these materials were stolen from Russian nuclear facilities. In the absence of modern nuclear materials accounting and access controls, it is anybody's guess whether these five cases comprise the total universe of stolen or diverted material. Given the current impoverished state of the Russian nuclear industrial complex and the lack of adequate independent inventory controls, weapon-usable fissile materials in Russia must be considered uniquely vulnerable to "insider threats" of diversion for sale to organized crime intermediaries or foreign governments.

In a similar vein, the recent sarin gas attack in Tokyo has demonstrated the reality of terrorist attacks and threats using weapons of mass destruction. This case may have relevance to the problem of nuclear terrorism, to the extent that the Aum Shinrikyo cult was able to: acquire a sophisticated laboratory and developed the capability to manufacture and stockpile a sizable quantity of poison gas; induce highly educated chemists and engineers to participate in the cult's activities; conduct recruitment and high-tech purchasing activities spanning several continents, including large operations in Russia; purchase a Russian MI-8 helicopter and ship it to Japan; acquire uranium properties in Australia; successfully purchase a \$400,000 precision machine tool for grinding spherical surfaces in the U.S; and identify the supplier and negotiate for the purchase of a laser interferometer and a vibration isolation table which, "with modest

reconfiguration can be used to measure spherical surfaces including plutonium used in nuclear weapons."⁷

Ironically, while the threat of nuclear terrorism and acquisition of nuclear weapons is often invoked to paint a pessimistic view of the role of political violence in the future international system -- and hence the need to retain a "credible" nuclear deterrent -- a moment's reflection reveals that a state's possession of nuclear weapons would be of no use in deterring future nuclear or other WMD attacks by international terrorist organizations and subnational groups. It would likely never be clear how, and against whom, a state could deliver a threat to retaliate in kind, and even if the target group were identified, the deterrent value of such a threat would be nil, or even counterproductive, inducing the very act of destruction it is designed to prevent. On the contrary, the nuclear risks posed by future threats of societal breakdown and terrorism are a strong argument for an early transition to a NFWF.

V. The Status of International Regimes to Eliminate Other Weapons of Mass Destruction.

Clearly a major factor affecting the political prospects for the elimination of nuclear weapons is the degree of success encountered in implementing effective parallel international regimes to ensure the nonproliferation and eventual elimination of chemical and biological weapons. While U.S. *declaratory policy* limits the use of nuclear weapons to retaliation against attacks on U.S. territory, forces, or allies carried out by nuclear weapon states or non-weapon states "associated" with a nuclear weapon state, current U.S. nuclear *employment policy* governing the contingency planning for operational use of nuclear weapons provides for their use in a much wider range of circumstances, including preemptive destruction of, or retaliation against, the chemical or biological weapons capabilities of states engaged in, or threatening, unconventional attacks on U.S. forces.

⁷ Staff Statement, U.S. Senate Permanent Subcommittee on Investigations (Minority Staff), Hearings on "Global Proliferation of Weapons of Mass Destruction: A Case Study of the Aum Shinrikyo," October 31, 1995, p.79.

Even if actual U.S. and other weapon-state employment policies could be brought into line with the prevailing Perm Five qualified "negative security assurance" regarding non-use of nuclear weapons, in the face of a continuing global failure to construct and enforce a credible CBW elimination regime, there would remain the problem of whether other states would actually believe the shift in policy, and adjust their own policies accordingly. One must also consider the reverse problem -- as long as nuclear weapon states maintain nuclear forces and doctrines for possible "first-use" against non-nuclear as well as nuclear-armed opponents, non-nuclear weapon states seeking a counter to this threat will have little incentive to foreclose options to deploy CBW-equipped deterrent forces.

It is important to recognize that the linkage between the CBW and nuclear elimination regimes is a political, not a technical one. From a technical perspective, nuclear weapons elimination can be pursued independently. Likewise, the political linkage is both existential and a matter of deliberate national policy. The latter could be modified without awaiting the completion of a robust CBW elimination regime. For example, a nuclear weapon state could declare that it would never employ nuclear weapons against a non-nuclear state under any circumstances, including the use or threatened use of CBW weapons, but would instead enhance the capability of its advanced conventional precision-strike weapons to perform this role. Indeed, such a statement would likely enhance the credibility of U.S. or coalition efforts to deter the use of CBW weapons in the future, by highlighting the greater likelihood of a militarily effective -- but purely conventional, and therefore politically more acceptable -- response.

VI. The Status of Cooperative Security Arrangements That Can Replace Nuclear Deterrence of Conventional Threats to National Survival.

In some areas of the globe, such as the Middle East, South Asia, East Asia, and possibly even Central Europe, the "final elimination" of nuclear weapons -- including destruction of already manufactured non-nuclear components, nuclear components, and stocks of weapon-usable fissile material -- may hinge on successful implementation of cooperative security arrangements that can replace nuclear deterrence of perceived threats to national survival with robust

mechanisms for defusing armed conflicts before they flare into violence, or escalate into full-scale conventional wars.

Conclusion

The likely political impediments to a transition to a NFWF fall into three categories: (1) problems posed by the attachment of a fairly narrow group of advanced nuclear countries -- supported (rhetorically) at least by a sizable number of nonaligned states and the prevailing interpretation of the NPT -- that the future of nuclear energy should encompass continued unhindered access to HEU and separated plutonium for non-explosive purposes.

(2) problems stemming from the reluctance of nuclear weapon and threshold states to forego the "extended deterrent" benefits of nuclear weapons to forestall CBW and large-scale conventional attacks and enhance a state's international standing and influence; and (3) problems stemming from the degree of transparency and extraterritorial rights required by a comprehensive nuclear weapons elimination regime.

All three categories must be continually addressed at each stage on the path toward elimination, but the dilemmas and complexities posed by the first category, if not resolved at least conceptually early in the process, may preempt even the possibility of later international consensus on the cooperative security and verification mechanisms that will enable transition to a NFWF.

