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Japan's Plutonium Overhang and Regional Insecurity

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"The Japanese government must reassure its own people and other countries that its nuclear energy program is exclusively for peaceful purposes. As a nation technologically able to make sophisticated nuclear weapons, Japan's abstention is very significant."

- Hiroshi Ohta, Director General for Scientific and Technological Affairs, Government of Japan, May 1991[1]

"I don't see any possibility of support among the Japanese public for Japan acquiring its own nuclear weapon."

- Takakazu Kuriyama, Japanese Ambassador to the United States, April 1992[2]

"The foreign ministry's job is to keep good relations with other countries... but it has no responsibility for Japan's nuclear and plutonium policies."

- Toichi Sakata, Head Nuclear Fuels Division, Science and Technology Agency, November 1992[3]

"It goes without saying that Japan itself will not develop nuclear weapons."

- Yoshio Okawa, November 1992[4]

This paper was first presented to the Japanese Physicians Forum Against Nuclear War and for the Elimination of Nuclear Weapons, Kobe, Japan, February 28, 1993.

1 Hiroshi Ohta, "Avoiding More Hiroshimas," *Nihon Keizai Shimbun*, translated by Asia Foundation's Translation Service Center, May 20, 1991.

2. W. Witter, "Japan doesn't want nukes, new envoy says," *Washington Times*, April 24, 1992, p. 1.

3. In I. Kunii, "Japan Government Split Over Plutonium Shipments," Reuter wire story, November 16, 1992.

4. Yoshio Okawa, "National Security and Stability in East Asia: A Japanese Perspective,"

Pacific Focus, Vol. VIII, No. 2 (Fall 1993), 83-107.

Until recently, Hiroshi Ohta's statement exemplified a consensus among the ruling elite of Japan (excepting a vocal hawkish minority) that it should forego nuclear weapons under all circumstances. The Japanese government's refusal at the July 1993 G7 meeting to commit itself to an indefinite extension of the nuclear Non-Proliferation Treaty marks the end of that consensus. As Japan's Foreign Minister Kabun Muto remarked at the time, "There should be more national debate, so that we can have more consensus within this country."[5] By October, the new coalition government strongly supported indefinite extension of the NPT at the UN General Assembly, but also exhorted the five nuclear powers to reduce their nuclear arsenals. The whole imbroglio left a lasting impression that Japan is not the rock-solid cornerstone of non-proliferation in the Asia Pacific region that security analysts have posited for decades.

Japanese officials rationalised their stance on the NPT in July 1993 as a response to the threat of North Korean nuclear proliferation. But Japan forced the other six great powers to soften their language on the need to extend the NPT indefinitely. An indefinite extension had been described as a "key step" toward achieving non-proliferation at the 1992 G7 meeting. Consequently, many observers in Japan are now convinced that Japan's refusal to endorse an indefinite extension of the Treaty was designed to keep open Japan's nuclear option.[6]

The Asia Pacific region is at a critical crossroad in relation to the spread of weapons of mass destruction. One path leads toward generalised proliferation of nuclear arms in the region, with North Korea, South Korea (or a reunified Korea after a few more years), and Japan acquiring nuclear weapons like those already deployed by Russia, China and the United States. The other path would keep Japan and Korea non-nuclear and gradually outlaw and disarm the nuclear arsenals of the three great powers in the region.

In this five part essay, I concentrate on Japan's critical role in the dynamics of nuclear proliferation in Northeast Asia. In part I, I describe Japan's plutonium program and the problems associated with it. In Part II, I analyze the realism of its effort to increase plutonium consumption as mixed oxide fuel for light water reactors. Next, I discuss the geopolitical impact of Japanese plutonium, especially on the proliferation propensity of North and

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PPNN paper CG12/6 presented to 12th Programme for Promoting Nuclear Non-Proliferation Core Group Meeting, Shizuoka, Japan, November 28, 1992, p. 3.

5. Japanese Foreign Minister Kabun Muto cited in D. Williams, "Japan Hedges on Non-Nuclear Pact," *Washington Post*, July 9, 1993.

6. D. Thurber, "Japan-Nuclear," Associated Press wire story, July 13, 1993.

South Korea. In part IV, I outline five policies to phase out plutonium in Japan that could initiate a regional non-proliferation dynamic. In part V, I analyze the need for a regional approach to non-proliferation that would complement these five domestic policy measures.

Japan's Plutonium Program

In 1993, Japan's 42 nuclear power reactors provided about 32,004 MWe (nett of power station use) of electricity generating capacity.[7] This capacity is run at about 70 percent capacity factor (that is, 6,132 hours per year) at which rate it produces about 740 tonnes of irradiated heavy metal spent fuel per year (y).[8]

The ultimate goal of Japan's nuclear program has been to shift from light water reactors fuelled by uranium 235 to fast reactors that "breed" their own plutonium fuel from the much more abundant uranium 238. Other countries still produce plutonium for military purposes, but only Japan remains committed to plutonium for power production.[9]

Japan's reprocessing capabilities do not meet its anticipated plutonium needs. For this reason, Japan contracted with foreign reprocessing companies to recover plutonium from spent reactor fuel. These contracts are with Cogema, a French parastatal corporation, and with British Nuclear Fuels Ltd, a company owned by the British Government. These companies operate reprocessing plants at La Hague, France, and Sellafield, England, respectively. At these plants, the useable uranium and plutonium is chemically separated from spent nuclear power reactor fuel. The recovered plutonium can be recycled as fuel for reactors.

Japan plans to transport the spent fuel from its reactors to Europe and to ship back the recovered plutonium (and residual spent fuel). Eventually, Japan expects to meet its reprocessing needs at its own plants at Tokai and Rokkasho, and at an additional facility to be built in Japan.

This strategy is prohibitively expensive and may be politically untenable as well, as will be discussed below. The nuclear program in general and the plutonium program in particular have overrun projected costs and been delayed ever since its inception. In Table 1, I show a recent estimate of the

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7. *Nuclear News*, "Worldwide List of Nuclear Power Plants," March 1993, p. 60.
8. *Spent Fuel Management and Transport*, "A Guide to Spent Fuel Disposal Worldwide," May 1992, p. 5.
9. Russia announced in January 1993 that it plans to construct three fast power reactors in the next two decades. Its ability to finance such a plan is highly doubtful. R. Delfs, "Japan's Justification," *Far Eastern Economic Review*, October 8, 1992, p. 13.

marginal costs of Japan's plutonium strategy (that is, excluding light water reactor fuel cycle costs). The estimated cost is $69.1 billion over a fifty year period.[10]

Table 1. Estimated Cost of Japan's Plutonium Program
(billions of constant 1993$)

LWR Fuel Reprocessing Plant (Rokkasho)	16.3 billion
Successor LWR Fuel Reprocessing Plant	16.3 billion
MOX Fuel Reprocessing Plant	22.9 billion
LWR MOX Fuel Fabrication Plant	0.4 billion
FBR MOX Fuel Fabrication Plant	0.6 billion
Ohma Advanced Thermal Reactor	2.6 billion
Demonstration FBR	3.3 billion
2 Commercial FBRs by 2030 at 4.2 b each	6.7 billion
Total	69.1 billion

(Does not include cost of Joyo and Monju FBRs, Fugen ATR, Tokai reprocessing plant which are treated as a plutonium research and development program)

Source: P. Leventhal and S. Dolley, Nuclear Control Institute, *A Japanese Strategic Uranium Reserve: A Safe and Economic Alternative to Plutonium*, Washington DC, April 12, 1993, p. 8; updated version, November 16, 1993.

In Table 2, I show projected physical parameters of Japan's plutonium economy over the next decade. In 1990 (see line A), 6.4 metric tonnes had been separated from spent fuel; 83 tonnes of spent fuel are projected to be produced in power reactors in the nineties; and 54 tonnes of that are planned to be separated in domestic or overseas reprocessing plants. Of the 6.4 tonnes of fissile plutonium (Pu) separated by 1990 (see line B), 4.5 tonnes had been used in the fast reactors and 0.02 in thermal research reactors, leaving a starting 1990 balance of about 1.9 T.

In the 1990s (see line C), a credible scenario of plutonium use in Japan's nuclear fuel cycle is about 5.7 tonnes of plutonium in MOX (mixed oxide fuel, that is, UO_2 mixed with plutonium) on the assumption that MOX is used first in two and later in four power reactors (and only in one third of the core due to control and safety reasons, or about 0.3 tonnes of plutonium per

10. P. Leventhal and S. Dolley, Nuclear Control Institute, *A Japanese Strategic Uranium Reserve: A Safe and Economic Alternative to Plutonium*, Washington DC, April 12, 1993, p. 8; as revised November 16, 1993, p. 9.

Table 2. Japan's Plutonium Overhang, 1990-2000 (Total Pu, tonnes)

A. Plutonium Discharged and Separated from power reactor fuel

(Up to 1990)		1991-2000		through 2000
Pu Discharged	Pu Separated	Pu Discharged (estimated)	Pu Separated (estimated)	Cumulative % of total Pu separated (estimated)
57.4	6.4	83	54	43

B. Plutonium Separation and Use Up to 1990

Pu Separated	Pu Use: Breeder Reactors	Pu Use Thermal Reactors	Pu 1990 Balance
6.4	4.5	.02	1.9

C. Credible Scenario of Plutonium Use in Power Reactors, 1991-2000

MOX Fuel Matrix	MOX Fuel Burnup	MOX fuel Enrichment	# Reactors MOX-Loaded	Total MOX Fuel Loaded	Total Pu Consumed
Assume Natural U	33,000	4.1	2 (1995-1997) 4 (1998-2000)	140	5.7

D. Credible Scenario, Fast Breeder Reactor-MOX and Advanced Thermal ReactorMOX Plutonium Use

Reactor	Type	Fuel Loaded	Total Pu Loaded
Joyo	FBR	8	1.0
Fugen	ATR	90	1.7
Monju	FBR	16	3.8

E. Projection of Separated Plutonium Balance in 2000

Pu Separated (1991-2000)	Pu Use Fast Reactors	Pu Use Thermal Reactors	Pu Balance (1991-2000)	1990 Pu Balance	Cumulative Pu Balance
54	6.5	5.7	41.8	1.9	43.7

Source: Tables A1-6, in F. Berkhout *et al*, "Disposition of Separated Plutonium," *Science and Global Security*, volume 3, 1992, pp. 33-39. Note: Pu here refers to total (fissile and "non fissile" Pu)

reactor per year). By the year 2000 (see line D), Japan might (at best) use about 6.5 tonnes of plutonium in non-power, research reactors. Thus, in 2000, given that Japan is committed to separating 54 tonnes of plutonium in

the nineties, the 12.2 tonnes of plutonium used in the nineties and the starting 1990 balance of 1.9 tonnes of plutonium would leave Japan holding about 43.3 tonnes of plutonium in 2000.[11]

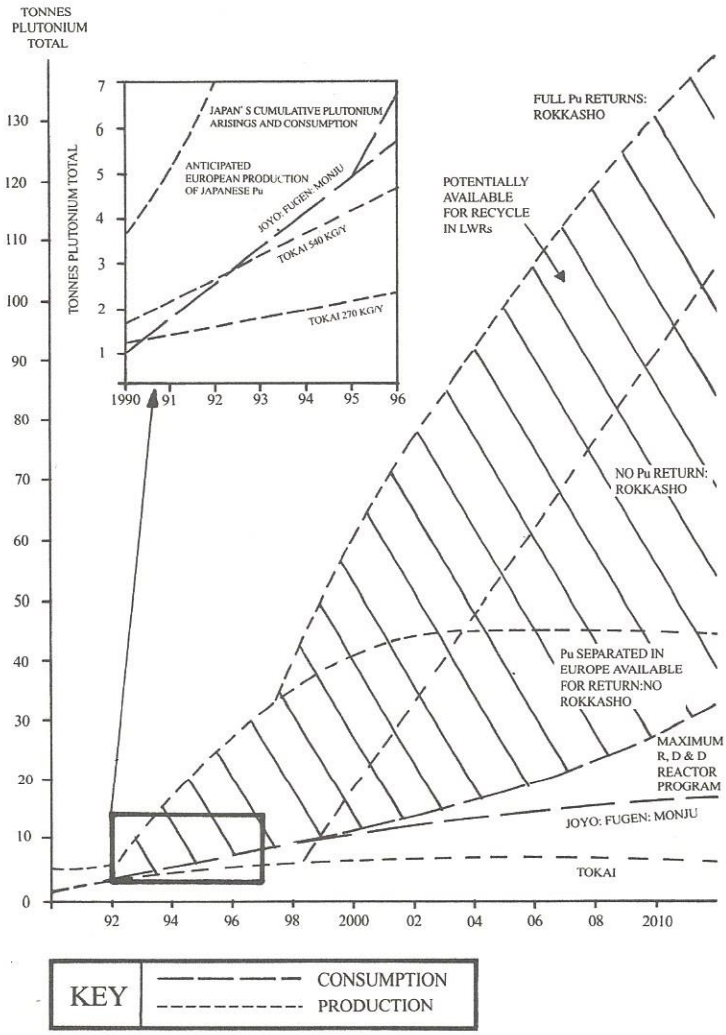
The Japan, therefore, is generating an excess of plutonium which will loom large above the rest of the region. This situation is summarized graphically in Figure 1 where the same basic calculations are shown (using two year old numbers which diverge slightly from the more recent numbers provided in Table 2). As can be seen, cumulative plutonium production to 2000 is about 56 tonnes of plutonium (assuming that Japanese spent fuel is reprocessed in the United Kingdom and France, and the Rakkassho-Mura comes on line in the late nineties—the latter being no longer likely). Cumulative non-power reactor plutonium use in 2000 is about 12 tonnes of plutonium. So Japan's "surplus" plutonium in 2000—whether held in spent fuel or separated by Japanese or European reprocessor—would be 43-44 tonnes of plutonium. This plutonium overhang would increase to 100 tonnes of plutonium in 2010.

Japan's Mox Manoeuvre

To "balance the books" and to meet Japan's commitment to the IAEA to not stockpile "excess" fissile plutonium, Japan has boosted its projected

11. Official estimates are that of the approximately 85 tonnes of plutonium that will accrue from reprocessing commitments by Japan by 2010, 12-13 tonnes will be used in the existing Joyo and Monju fast breeder reactors; 10-20 tonnes in a yet-to-be-built series of fast breeder reactors; around 10 tonnes in the Fugen thermal reactor and proposed demonstration thermal reactor; and about 50 tonnes in light water power reactors, with 2 reactors loaded with MOX in the mid-1990s, 4 in the late 1990s, and a dozen in the early 2000s. The PNC states that it has produced 2.5 tonnes of fissile plutonium from Japan's Tokai reprocessing plant up to the end of March 1992 and had imported 1.3 tonnes to that date, for a total supply of 3.8 tonnes of fissile plutonium, versus a consumption of 3.4 tonnes (0.5 tonnes used for research and development, 0.9 tonnes for the first core of Monju, 1.1 tonnes for Joyo, and 0.9 tonnes for Fugen). Thus, its stock of fissile plutonium amounted to 0.4 tonnes at the end of March 1992 according to official figures. Its projected use rate is 0.7 tonne/year versus annual domestic supply from Tokai of 0.4 tonne/year, leaving an annual shortfall of 0.3 tonne/year. On this basis, Japan claims it needs to ship 1 tonne of plutonium from Europe every three years. In November 1992, however, Japan's Science and Technology Agency announced that plutonium fuel fabrication problems had delayed the start-up of the Monju breeder reactor by a year so that the tonne of plutonium imported in early 1993 will not be used until 1995 at the earliest, creating what one Japanese official called a "running stock." Advisory Committee on Nuclear Fuel Recycling, Japan Atomic Energy Commission ,"Nuclear Fuel Recycling in Japan," (mimeo translation), August 1991; J. Varley, "A Surfeit of Plutonium," *Nuclear Engineering International*, July 1992, p. 14; A. MacLachlan *et al*,"PNC, With Figures in Hand, Argues Impending Need to Ship Plutonium," *NuclearFuel*, August 3, 1992, p. 6; D. Sanger, "Japan Says Technical Problems Will Force Storage of Plutonium," *New York Times*, November 28, 1992, p. A3.

Figure 1. Anticipated Production and Consumption of Plutonium in Japan, 1990-2010



Source: F. Berkhout, T. Suzuki, W. Walker, "The approaching plutonium surplus: a Japanese/European predicament," *International Affairs*, volume 66, no. 3, 1990, p. 529.

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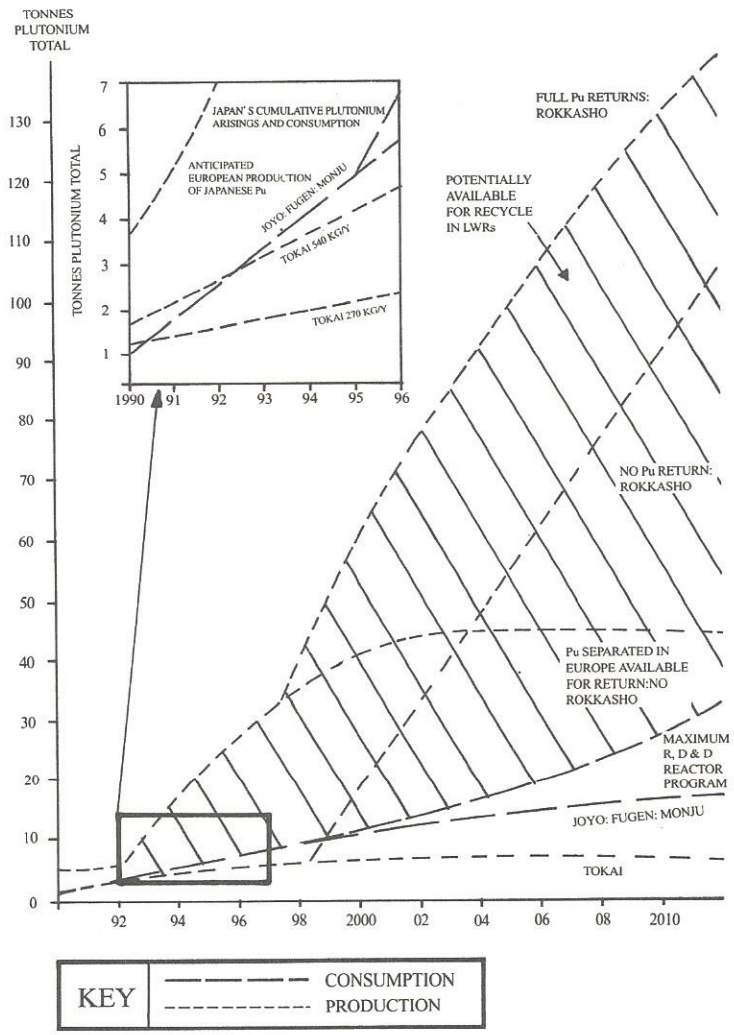

Source: F. Berkhout, T. Suzuki, W. Walker, "The approaching plutonium surplus: a Japanese/European predicament," *International Affairs*, volume 66, no. 3, 1990, p. 529.

plutonium use to match its plutonium production. Consequently, Japan has overstated its likely plutonium usage in fast and research reactors; and the likely rate of recycling of plutonium in MOX fuel in power reactors.[12] Realistically, however, analysts calculate that Japan cannot use nearly as much plutonium as MOX fuel as projected by the government, for at least nine reasons:[13]

(a) Inexperience with MOX: Japan has little experience in making or using MOX and it will take time to overcome inevitable technical glitches. Such delays will render unrealistic the official rate of plutonium usage. The schedule to introduce MOX into Tokyo Electric and Kansai utilities' LWRs in the mid-1990s is already projected to slip.[14] (MOX is currently used only at the Fugen advanced thermal reactor at Tsuruga and at the experimental Joyo fast breeder reactor.[15]

(b) Limited Foreign MOX Supply: Japan's policy is to rely on overseas MOX fabricators to support the gradual introduction of MOX into power reactors in Japan until the Japanese MOX plant is built at Rokkasho Mura. Western European and Japanese MOX fabrication capacities are small and cannot handle a large fraction of Japan's plutonium overhang, which will force Japan to stockpile the separated plutonium. As of December 1992, Japanese utilities with spent fuel in reprocessing plants at the UK and French facilities had only just begun to study adapting European MOX fabrication methods to Japanese MOX needs.

(c) Opposition: MOX will increase local government and citizen opposition to the nuclear power plans and operations of the electric utilities.

(d) Cost: MOX is 4-6 times more costly than using enriched uranium fuel.[16]

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12. MOX or mixed-oxide fuel is a combination of uranium and plutonium oxides.

13. The subsequent points are based on W. Walker and F. Berkhout, "Japan's Plutonium Problem—and Europe's," *Arms Control Today*, September 1992, pp. 3-10.

14. N. Usui, "Japanese Utilities Studying European MOX Fabricators," *NuclearFuel*, December 21, 1992, p. 14.

15. G. Taylor, "Japan, A Look At Its Future," *Nuclear News*, July 1992, p. 34.

16. For estimates of reprocessing and MOX costs, see F. Berkhout and W. Walker, "Thorp and the Economics of Reprocessing," Science Policy Research Unit, University of Sussex, Brighton, England, November 1990; update of latter in F. Berkhout, "Fuel Reprocessing at THORP," Center for Energy and Environmental Studies, Princeton University, New Jersey, 1992; S.M. Stoller Corporation, "Report to the Electric Power Research Institute on the Economics of Using Weapons Plutonium in Light Water Reactors," Pleasantville, New York, December 1990; J. Taylor, "Disposal of Fissionable Material From Dismantled Nuclear Weapons," Electric Power Research Institute, paper to American Association for Advancement of Science, February 18, 1991; and K. Uemtsu, "Technological and Economic Aspects of PU Utilization in Fission Reactors," paper to International Symposium on Conversion of Nuclear Warheads for Peaceful Purposes, Rome, June 15, 1992; Organisation for Economic Cooperation and Development, "Study on the Economics of the Nuclear Fuel Cycle," Paris, June 1992; and reference to Table 1 in this essay.

MOX fuel costs about $1,300-1,600/kg of fuel whereas uranium yellowcake cost about $22/kg (spot price, late 1992) and can be enriched at between $40-120/separative work unit (the latter being a major portion of the cost of uranium enrichment).

Thus, enriched uranium fuel would have to be far more expensive before MOX fuel could compete with it. This relative disadvantage of MOX relative to other nuclear fuels is likely to worsen due to the glut of uranium associated with the release of enriched uranium from US and former Soviet nuclear weapons to civilian nuclear power programs, the continuing slowdown of which also reduces uranium demand and thereby uranium prices. It would be far cheaper for Japan to forego the MOX recycling effort and simply stockpile low or high enriched uranium to fuel its reactors, should these continue to operate.[17]

(e) Utility Reluctance: Utilities in Japan are averse to becoming dependent on a government monopoly fuel supplier (Power Reactor and Nuclear Fuel Development Corporation known as PNC) which will be the case if the plutonium MOX program proceeds. The private sector is also reluctant to incur responsibility for the expensive plutonium breeding program which has resulted already in the Japanese Atomic Energy Commission proposing that government take an even bigger role in the breeder program.[18]

(f) Sea Shipments Required: MOX recycling will result in many local and international shipments of plutonium, with all the attendant political and security problems which surfaced in January 1993 around the voyage of the *Akatsuki Maru.*

These six factors suggest that the policy pendulum in Japan should swing away from the plutonium economy, and toward energy alternatives that exist in Japan. These include increased energy efficiency which is also an important source of Japan's trade competitiveness and export opportunities; cleaner fossil fuel technologies such as natural gas, clean coal, and biomass using fuel cells; and geothermal energy.

Four other factors also increase the relative cost of nuclear power in Japan and compound further the difficulties that already afflict the plutonium

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17. Leventhal and Dolley estimate that over fifty years, Japan would save nearly $43 billion by not reprocessing, recycling, or breeding plutonium in reactors operating or under construction in Japan. As their comparison is not conducted in discounted dollars, this conclusion may be challenged; but it is unlikely that discounting would reverse a net advantage this big. Their calculated savings derive from avoided capital costs associated with plutonium fuel cycle and the fuel price penalty associated with using plutonium in MOX fuel rather than uranium. See P. Leventhal and S. Dolley, Nuclear Control Institute, *A Japanese Strategic Uranium Reserve: A Safe and Economic Alternative to Plutonium, Washington* DC, April 12, 1993.

18. *Mainichi Daily News*, "Gov't asked to take up slack in breeder reactor program," July 29, 1992, p. 11.

program. These are:

(g) Hazard: the Japanese public increasingly distrusts official declarations of the safety of nuclear power, especially since the Chernobyl, Fukushima, and Mihama nuclear reactor accidents.[19] Japan is also threatened by the downwind radioactive threat emanating from other countries such as Russia. In August 1992, then US Central Intelligence Agency director Robert Gates testified that four small Chernobyl-style reactors in the Russian Far East operate without regulatory guidance.[20]

(h) Radioactive Wastes: Japan still lacks any credible nuclear waste strategy other than stockpiling spent fuel at ponds at reactor sites, and low level waste at a new repository at the Rokkasho-Mura site opened in October 1992.[21] The Japan Nuclear Fuel Service Company plans to dispose of the high level wastes by vitrifying them followed by deep disposal (although direct disposal is also being considered)—but two plans to build underground research laboratories have been halted by local government opposition.[22]

Japan has discussed with Russia the possibility of dumping its radioactive wastes in Siberia (a proposal that local communities are unlikely to welcome warmly) and has set up a joint commission to study what to do with these materials.[23] Ironically, Japan's outrage at Russia's dumping (of relatively small quantities) of radioactive waste in the Sea of Japan has virtually eliminated any chance that Japan might reactivate Japan's past efforts to dump (much larger quantities) of radioactive waste in the Pacific Ocean seabed.[24]

(i) Dependency: Far from increasing energy independence and security (the major non economic argument made by its Japanese proponents), nuclear power and the plutonium economy as embodied in the MOX recycle option increases energy dependence and insecurity by: 1) increasing energy costs

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19. D. Sanger, "Japan Nuclear Accident May Impede Push for Plants," *New York Times*, February 11, 1991, p. A3.

20. These reactors are known as GBWR - 112, Model EGD - 6 and are graphite moderated boiling water reactors used for heat and power production. Each reactor is 11 MW and uses fuel enriched to 3-3.6 percent uranium. They are located at Bilibino. Associated Press, "Gates Warns of Contamination in Former Soviet Union, *Washington Post*, August 17, 1992, p. A7; and William Potter, Monterey Institute of International Studies, personal communication, May 10, 1993.

21. *Nucleonics Week*, "JNFL Opens Rokkasho LLW Site With First Drums of Waste," October 12, 1992.

22. *Spent Fuel Management and Transport*, "A Guide to Spent Fuel Disposal Worldwide," May 1992, p. 5.

23. Reuter's, "Russia Said Planning Joint Body on Nuclear Waste," wire story, April 14, 1993; UPI, "Japan calls for nuclear waste facilities for Russia," wire story, April 11, 1993.

24. *Asahi Evening News*, "Russian Nuke Waste Poured in Japan Sea," October 18, 1993, p. 14; *Mainichi Daily News*, "Japan accused of dumping more N-waste than Russia," October 26, 1993, p. 16.

relative to available alternatives;[25] 2) allowing the United States and uranium suppliers such as Australia to dictate to Japan what it does with its fuel; 3) making Japan rely on European suppliers of reprocessing, spent fuel storage, and MOX fuel fabrication capabilities; and 4) leaving Japan reliant on overseas uranium supplies rather than domestically available alternatives such as geothermal or energy efficiency resources.

It bears emphasising that without a plutonium breeding bridge to an autarchic, self-replacing supply of plutonium, a uranium-based nuclear strategy makes little sense. The first public glimmer that high level officials may be rethinking their plutonium strategy came to the surface in April 1992 when Takao Ishiwatari, president of the state-funded Power Reactor and Nuclear Fuel Development Corporation told a news conference that Japan was overemphasising the production of plutonium. "My comment may be controversial," he said, "but when discussing the fast breeder reactor, my present thinking is that there should be less stress on the breeder side."

"I agree that there is plenty of plutonium in the world today," he added, "and therefore we probably don't have any urgent need to breed plutonium."[26]

Although officials of the Science and Technology Agency later qualified his statement as personal and not representative of public policy, there is little doubt that senior officials are rethinking Japan's commitment to a plutonium economy. In May 1992, for example, the *Mainichi Shinbun* newspaper reported that the PNC was considering not using the Monju fast reactor to breed plutonium (by removing the uranium 238 blanket around the reactor core) and only burning plutonium. In July 1992, a new rationale for building fast reactors in Japan—the burning up of weapons-grade plutonium from nuclear weapons dismantled in the former Soviet Union—was promoted by the Science and Technology Agency, revealing the decreasing persuasiveness of the energy argument for breeders.[27] In August 1992, the PNC stated that in spite of Mr. Ishiwatari's comments on April 20, the objectives of using Monju as a fast breeder reactor had not changed.[28]

In November 1992, divisions between different offices of the Ministry of

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25. As P. Leventhal and S. Dolley show, substituting a less risky stockpiling of low enriched uranium for the plutonium strategy would cost either no more or substantially less (as much as 50 percent less) than the plutonium program between 1993 and 2030. See note 10.

26. Cited in V. Laroi, "Japan Should Rethink Plutonium Policy—Official," Reuter wire story, April 20, 1992; see also *Japan Militarism Monitor*, "Japan's plutonium imports," August-October 1990, number 56, p. 7; and *Asahi Evening News*, "Japan May Put Off Plans To Breed Plutonium in Reactors," April 21, 1992, p. 5.

27. Kyodo, "Tokyo to Design Plutonium-Fired Power Reactor," US Joint Publication Research Service, JPRS-TND-02-025, July 22, 1992, p. 7.

28. *Nuclear Engineering International*, "Monju Still Breeding," August 1992.

Foreign Affairs surfaced when officials hinted that Japan might scale back plans for another 30 shipments of plutonium from Europe, revealing internal doubts about the wisdom of continuing on the plutonium path, while others reiterated Japan's commitment.[29] These contradictory indicators signal that the Japanese government is retreating—albeit haphazardly and reluctantly—from its long run goal of achieving a self-sustaining plutonium economy.[30] The new coalition government is publicly reevaluating the efficacy of Japan's nuclear power and plutonium recycling programs. "We must think realistically about nuclear power," said Prime Minister Morohiro Hosokawa, "Realistically about securing diverse energy sources but also about nuclear safety."[31] In part, the new debate reflects the struggle between Japan's elected reformists in the coalition government who are determined to direct policy, and government bureaucrats who have formulated every aspect of Japan's energy policy during the era of LDP supremacy.

Yet even within the narrow logic of the nuclear establishment, light water power reactors and MOX recycling of spent fuel only made sense as a transitional bridge to a plutonium breeder economy due to the long run shortages of uranium fuel. As Japanese nuclear proponent Yumi Akimoto stated in reference to the need for breeders in 1990, "Any industrial system which utilizes only a limited part of natural resources does not qualify as a true "technological paradigm."[32]

Abandoning the breeder reactor would subvert this central nuclear myth based on a technological paradigm that promised but could never deliver absolute energy independence. This vision was always a chimera. Japan's real energy security lies in its extensive economic interdependence with the diverse world fossil fuel supply market. Fossil fuel exporters rely heavily on Japan directly as a source of funds, investment opportunities, technology and markets. They are beholden indirectly to Japan via its economic integration with the United States and Western Europe, on which, in turn, oil supplying states elites depend in many ways—in some cases, for their political and military survival.

Japan cannot achieve absolute energy security and independence, by the

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29. D. Sanger, "Japanese May Cut Atomic Shipments," *New York Times*, November 19, 1992, p. 1; United Press International, "Japan Stands Firm on Future Plutonium Shipments," wire story, November 17, 1992; T. Reid, "Japanese Debating Plutonium Issue, Reaction from Environmentalists Fuels Argument About Policy," *Washington Post*, November 17, 1992.

30. D. Sanger, "Japan Thinks Again About Its Plan to Build a Plutonium Stockpile," *New York Times*, August 3, 1992.

31. Yuji Aso, "Nuclear Power Will Test Japanese Coalition's Unity," Reuter wire story,August 11, 1993.

32. Yumi Akimoto, "The Need for Plutonium Recycle," paper to Programme for Promoting Nuclear Non-Proliferation, Washington DC, November 9, 1990, p. 2.

nuclear or any other route. The best protection of its energy security are its unprecedented economic financial, trading, and investing power with the rest of the world combined with stringent energy efficiency standards and a strong domestic renewable (especially geothermal) energy program.

Geopolitical Impact

Even before Japan dragged its feet in July 1993 on the NPT extension, its plutonium program attracted a great deal of international criticism due to the transport and stockpiling issues. No security analyst believes that Japan's planners cannot count and many in Beijing, Seoul and Pyongyang consider Japan's projected plutonium supply and demand schedule to be incredible. They ponder the significance of Japan's probable plutonium overhang in the coming decade. This lingering question is overlaid with memories of Japanese colonialism and invasion and merges with contemporary stereotypes of the Japanese businessman and tourist as the arrogant "yellow yankee." These perceptions of Japan blend with a belief that the United States may withdraw eventually from its security alliance with Japan, thereby removing the American restraint on Japanese proliferation propensity. Thus, it is understandable that many political leaders, strategic analysts, and ordinary people are not confident that Japan will never produce nuclear weapons in the medium or long term future, in spite of its protestations to the contrary.

Other, non-nuclear Japanese capabilities fuel this perception. As one US State Department analyst put it in 1986, Japan's space program endows it with "long-range defence applications for national security."[33] Undoubtedly, he was referring to satellite reconnaissance and ICBM capability arising from its space booster rocket. Other relevant capabilities include its supercomputers (which would be handy for designing nuclear warheads and missiles by simulation); and its inertial confinement fusion research (which could be used to design thermonuclear weapons).[34] All these "dual

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33. W. Strand, "International Competition of Satellite Launch Services," 28th Session, Senior Seminar, US State Department, Foreign Service Institute, Washington DC 1986, p. 16; released under a US Freedom of Information Act request.

34. The Japanese Government once contracted with Mitsubishi Company to develop a very fast, very large nuclear powered "submersible tanker" to carry oil and other cargo under water. This vessel (never built) would be an ideal launch platform for submersible missiles. It is hard to believe that the government considered submarines merely to move mundane cargo. R. Lynn, "Will Japan Go Nuclear in the 70's?" US Army War College, Carlisle Barracks, Pennsylvania, March 16, 1973, p. 21.

capabilities" add to the accurate perception that Japan has had a full complement—albeit latent—of nuclear weapons capabilities since the early seventies.[35]

Japanese nuclear proponents argue that nuclear proliferation is impelled by regional disputes, not Japan's plutonium program. As Japan is not party to regional disputes generating nuclear proliferation, goes the logic, it follows that Japan's plutonium activities do not increase the danger of nuclear proliferation.[36]

Before disposing of this argument, I emphasize that Japan's plutonium program is *not* equivalent to a nuclear weapons program (as North Korean propagandists assert). Furthermore, it remains highly unlikely that Japan will produce nuclear weapons in the foreseeable future. Yet for more than three decades, even US intelligence and security analysts have debated the likelihood of and cautioned against the possibility that Japan might do so.

In 1957, for example, the State Department's intelligence analysts warned that: "Contrary to the impression conveyed by the overwhelming popular sentiment in Japan against any association with nuclear weapons, there is mounting evidence that the conservative government in Tokyo secretly contemplates the eventual manufacture of such weapons, unless international agreements intervene." They timed the event to take place no earlier than 1961.[37]

In 1966, a report to the US Air Force concluded that "Although Japan has sufficient technological and economic resources to permit indigenous development of nuclear weapons in the early 1970s, Japanese domestic political trends currently suggest that Japan will not undertake a nuclear weapons program during the 1966-1980 period."[38]

In 1974, the intelligence agencies of the US Air Force and Navy saw:

[A] strong chance that Japan's leaders will conclude that they must have

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35. See R. Lawrence *et al*, "The Scientific Base for Nuclear Weapons Development," in *Implications of Indian and/or Japanese Nuclear Proliferation for U.S. Defence Policy Planning*, Strategic Studies Center, Stanford Research Institute, SSC-TN-1933-1, January 1974, pp. 37-38.

36. A. Suzuki, "Nuclear Development in Japan and Other East Asian Countries," PPNN paper CG12/1 presented to 12th Programme for Promoting Nuclear Non-Proliferation Core Group Meeting, Shizuoka, Japan, November 28, 1992, section 5 (unpaginated).

37. Division of Research for the Far East, "The Outlook for Nuclear Weapons Production in Japan," Intelligence Report, Office of Intelligence Research, US State Department, August 2, 1957.

38. Bendix Systems Division, *Problems of U.S. Defense Policy in a World of Nuclear Proliferation*, BSR 1413, volume 2, report to US Air Force, Future Environments Branch, Concepts and Objectives Division, Directorate of Doctrine, Concepts and Objectives, September 15, 1966, p. A-77; released under a FOI request.

> nuclear weapons if they are to achieve their national objectives in the developing Asian power balance. Such a decision could come in the early 1990s. It would likely be made even sooner if there is any further proliferation of nuclear weapons, or global permissiveness regarding such activity. These developments would hasten erosion of traditional Japanese opposition to a nuclear weapons course and permit Tokyo to cross that threshold earlier in the interests of national security.[39]

Arrayed against them were the CIA and the intelligence services of the State Department and the Army who believed that "Japan would not embark on a program of nuclear weapon development in the absence of a major adverse shift in great power relationships which presented Japan with a clearcut threat to its security." [40]

In a 1979 CIA study of nuclear proliferation, Rand analyst Jonathan Pollack concluded:

> Not only would the political and diplomatic costs of Japan's nuclearization be enormous, the military advantages that might allegedly accrue would also be highly suspect. With or without nuclear weapons, Japan remains an exceedingly vulnerable society...However, the acquisition of nuclear weapons by either Taiwan or South Korea might be the kind of event sufficiently disruptive of the political and military status quo that past opposition to Japanese nuclear armament could erode significantly...[T]he possibility of a nuclear-armed Japan in the near future in the absence of enormously destabilizing political and military changes must still be judged exceedingly slim. If unanticipated events cannot be conclusively ruled out, neither do they assume much plausibility." [41]

Not all elements of the US security establishment have viewed the prospect of Japanese nuclear armament as inherently objectionable. Indeed, some US analysts have contemplated various arrangements whereby the United States could accept, cooperate and assist rather than obstruct and dissuade Japan's from arming itself with nuclear weapons. As one American study group put it in a report to the Pentagon in 1974:

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39. US Central Intelligence Agency, *Prospects for Further Proliferation of Nuclear Weapons*, DCI NIO 1945/74, September 4, 1974, p. 2.
40. *Ibid.*
41. J. Pollack, "The People's Republic of China in a Proliferated World," in J. King, *ed, International Political Effects of the Spread of Nuclear Weapons,* US Central Intelligence Agency, US Government Printing Office, 1979, pp. 130-131.

> Aside from the uncertainties associated with the appearance of a new nuclear weapon state and the uncertainties about Japan's behavior as a major military power, there appear to be no necessarily or immediately disadvantageous implications for the United States associated with [Japan's] attainment of nuclear weapons status.[42]

This kind of thinking is *not* representative of American thinking today due to the demise of the Soviet threat and the active concern about regional proliferation in Washington. In 1993, Japan's reprocessing program troubles American policy makers mostly because it greatly complicates their task of steering the region away from nuclear proliferation, particularly Korea.

In short, as Roger Gale wrote in 1978, Japan undeniably already has the technology to produce rapidly a nuclear arsenal, but also faces severe problems of command and control, delivery range, vulnerability, and incredibility (due to lack of a second strike capability and the concentration of the bulk of its population in a few cities).[43] Japan's non proliferation policy, therefore, is mostly a matter of self-restraint based on self interest, and in particular, the reliability of its alliance with the United States.

But for regional states contemplating the domestic difficulties of the United States and the medium term prospects for US withdrawal from forward deployment in the region, the possibility that Japan may proliferate in its own self interest, possibly in collaboration with the United States, is self evident. The prospect of Japanese nuclear armament in concert with the United States in the medium term might not overly worry Americans; but it compels the rest of the region to adopt a worst case assumption that stimulates a determination to match Japan's capabilities.

Thus, Japan's nuclear proliferation potential affects the calculus of the rest of the region, whatever Japan's current or ultimate intentions. As one Indian author put it, Japan is "on the nuclear option threshold."[44] Events in July 1993 made it clear that Japan has begun to inject its latent capability into its foreign policy to compel North Korea to observe its non proliferation commitments. At a news conference after the ASEAN Ministerial meeting in Singapore, then Japanese Foreign Minister Kabun Muto stated bluntly:

> If North Korea develops nuclear weapons and that becomes a threat to Japan,

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42. See R. Lawrence, "Implications of Indian," *op. cit*, p. 75.
43. R. Gale, "Nuclear Power and Japan's Proliferation Option," *Asian Survey*, volume 18, November 1978, pp. 1122-1123; see also J. Sorenson, "Nuclear Deterrence and Japan's Defence," *Asian Affairs*, volume 2, November-December, 1974, pp. 55-69.
44. S. Dutt, "Japan: On The Nuclear Option Threshold," *Strategic Analysis* (New Delhi), volume 16, no. 3, June 1993, p. 283.

> first there is the nuclear umbrella of the United States upon which we can rely. But if it comes to the crunch, possessing the will that we can build nuclear weapons is important.[45]

These and other comments by Muto reportedly reflected an internal conflict within the outgoing Miyazawa cabinet over nuclear issues. The coalition government does not share these views. It does, however, reflect the view of critics of the NPT that the Treaty is inherently discriminatory and that China has not matched the major reductions in nuclear weapons by the nuclear superpowers. As Japan is China's main donor of foreign aid, it could set conditions related to disarmament. Although such a policy was discussed in the former LDP Japanese government, the coalition government has chosen to not apply such pressure to China in contrast to its stance on North Korea.[46] But whatever the realities of Japan's military intentions in the medium and long run (from 2000-2020), the reality of external perceptions and fears of Japan's plutonium overhang exist. They are particularly strong in both Koreas. It is myopic and incredible for Japanese leaders to pretend otherwise. For these reasons, it is unrealistic to expect other aspiring powers—and especially Korea—to forego forever the rights and capabilities that Japan has reserved for itself in this domain.

It is also untenable for Japan to argue that its own plutonium program is transparent and presents no threat to anyone because it is safeguarded by IAEA inspectors; but to argue that the same activity even when safeguarded by IAEA inspectors in North Korea is threatening and should be abandoned and dismantled.[47] Japanese officials argue that this stance is justified by reference to the bilateral Korean commitment in 1991 to forego reprocessing in Korea, although such activity is entirely legal within the NPT framework. However, Japan's withholding of economic aid and diplomatic recognition until North Korea's reprocessing plant is demolished is viewed by North Korea as a vote of no-confidence in the IAEA by Japan, and as an exercise in great power strongarming.[48]

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45. *International Herald Tribune*, "Japan Rattles Nuclear Saber at North Korea," July 30, 1993.

46. T. Reid, "Japan's Shift on A-Pact Raises Concerns Abroad," Washington Post Foreign Service, wire story, July 15, 1993.

47. D. Sanger, "Japan Shipment of Nuclear Fuel Worries Asians, Tokyo Emphasising Use for Energy, Not Arms" *New York Times*, November 9, 1992; *Nucleonics Week*, "Japan Wants North Korean Facilities Inspected Before Resuming Relations," February 6, 1992, p. 16.

48. Indeed, read literally, the 1991 agreement permits North Korea to complete the construction of the reprocessing plant, but not operate it. Japan could insist that such a plant not be operated with reference to the bilateral denuclearisation accord, but not that it be dismantled. Greenpeace International, *The Plutonium Trade: A Troubling New Era of*

Officials in the Bush Administration accepted the Japanese view on this issue in the belief that great power realities made such double standards inevitable. As one reportedly said, "If it was any other country than Japan, we would look this plutonium project and conclude that a bomb was the real motive. But the fact is that it's OK for the Japanese because we trust them, and not OK for the North Koreans because we don't trust them."[49] Such judgements are not a stable foundation for a durable non-proliferation regime.

South Korea is also determined to match Japan's plutonium capabilities. I will not detail the long history of South Korean attempts to obtain reprocessing technology which began in 1969.[50] What is less well known are its recent attempts to obtain reprocessing-related technologies.

In spite of its renunciation of reprocessing technology in the North-South Denuclearisation Declaration in 1991, South Korea tried to obtain reprocessing services from Russia, and reportedly already has obtained enriched uranium from that source. In mid 1992, officials at the Russian Ministry of Atomic Energy (MINATOM) admitted that they had discussed South Korean financing of their Krasnoyarsk RT-2 reprocessing plant. As of mid 1993, the plant is on hold due to local opposition objecting on environmental grounds to the import of foreign spent fuel from the Ukraine and other prospective suppliers of spent fuel.[51] The US government also objected to the Krasnoyarsk plan because it would stimulate nuclear weapons proliferation in Asia.

In September 1992, South Korea reportedly made another direct request to United States to transfer a reprocessing technology which is part of the Fuel Cycle Facility designed at Argonne National Laboratory for the US Department of Energy's Integral Fast Reactor—a request which was rejected in Washington.[52] The technology requires the use of hot cells to remove plutonium and other actinides from the refined spent fuel from the fast reactor. South Korea has reportedly renewed this rejected demand that the United States supply reprocessing technology.[53]

To satisfy these South Korean demands while still discouraging direct

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Proliferation, Amsterdam, March 1, 1993, p. 23.

49. Cited in Sanger, "Japan Shipment."

50. For historical details, see my *Pacific Powderkeg, op. cit.*; and "The Republic of Korea and the Nuclear Issue," *op. cit.*, pp. 35-37.

51. M. Hibbs, "Completion of RT-2 Project On Hold; South Korean Financing a Question Mark," *NuclearFuel,* January 4, 1993, p. 5.

52. M. Hibbs, "South Korea Renews Quest for Plutonium Separation Ability," *NuclearFuel,* October 29, 1992, p. 7.

53. Greenpeace International, *The Plutonium Trade: A Troubling New Era of Proliferation,* Amsterdam, March 1, 1993, p. 26.

reprocessing, the United States has cooperated with it to develop liquid metal technology, the cooling system of breeder reactors—which in turn require reprocessing spent fuel to provide the initial plutonium fuel! The United States has also reviewed its opposition to South Korea's plan to reuse spent fuel of US origin from light water reactors in its heavy water reactors (obtained from Canada) using a Canadian recycling system in which the initial steps are the same as for reprocessing (although the plutonium itself need not be separated out of the waste stream in this technology).

In the mid-eighties and then again in late 1991, Canada refused to cooperate with South Korea to facilitate the transfer of co-processing technology, at the request of the United States.[54] Canada has marketed additional heavy water reactors in South Korea by advertising their ability to recycle the plutonium and unfissioned uranium in spent fuel from light water reactors into heavy water reactor fuel, especially via MOX after reprocessing and plutonium extraction. The Canadian technology offers three recycling options to South Korea: 1) reprocessing light water reactor spent fuel and using separated plutonium and uranium 235 in MOX; 2) using recovered plutonium to initiate a thorium-based fuel; and 3) recycling "recovered uranium" into heavy water reactors and storing the plutonium for future use.

In November 1991, South Korea and Canada began a joint study of a hybrid option.[55] In this technology, known as "Direct Use of Spent PWR Fuel in CANDUs" or DUPIC, the spent fuel rods from pressurized LWRs are refabricated by reconstituting the fuel pellets into CANDU fuel bundles without using wet chemical reprocessing to extract the useful residual isotopes.[56] Unfortunately, CANDU reactors are refuelled continuously, and it is more difficult to track confidently many CANDU fuel bundles incorporating plutonium from LWR spent fuel than it is to monitor the normally unenriched once-through fuel bundles that do not incorporate recycled spent fuel from light water reactors.

The recent sale of two Canadian heavy water reactors to South Korea indicates a high level of commitment to some version of this strategy on the part of South Korea. Should Japan (and North Korea and China) continue with reprocessing programs, it is highly likely that South Korea will follow suit in the mid-to late-nineties. Suppliers of uranium to South Korea's light

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54. M. Hibbs, "South Korea Renews Request for Plutonium Separation Ability," *NuclearFuel,* October 29, 1992, p. 7; US General Accounting Office, *Japan's Shipment of Plutonium Raises Concerns About Reprocessing*, GAO/RCED-93-154, Washington DC, June 1993, pp. 12-13.

55. A. MacLachlan, "Organization Set Up To Handle Storage of Waste in South Korea," *NuclearFuel*, April 27, 1992, p. 9.

56. R. Silver, "Spent Fuel Could Be Used in CANDU, Says Canadian-Korean Research Team," *NuclearFuel*, October 26, 1992, pp. 12-13.

water reactors such as Australia and the United States which reserved the right to disallow reuse of spent fuel would be hard pressed to deny South Korea this option should Japan continue on its current path.

Japan's plutonium strategy stimulates the *nuclear capabilities race* now underway between Japan and Korea, especially in Korea, with Russia, the United States, and China as concerned bystanders. If all the direct and indirect political and military costs of this race are included, then the geopolitical impacts of Japan's plutonium strategy likely exceed all the other costs listed earlier.

Japan's Policy Options

For all these reasons, it would be prudent course for Japan to abandon its plutonium program immediately. Instead of promoting plutonium, Japan should:

(a) Phase Out Plutonium Breeders: Japan should shutdown the advanced and fast reactor programs except where the latter are used to destroy weapons plutonium, under international supervision, and if and only if fast reactors are adopted by the international community as the best way to destroy plutonium from weapons and the already separated Japanese plutonium;

*(b) Stop Separating Plutoniu*m: Japan should stop construction of the Rokkasho-Mura reprocessing plant, and stop operating and dismantle the Tokai-Mura reprocessing plant; and should abandon plans to construct a MOX fuel fabrication plant, and to import and use MOX fuel in LWRs;

(c) Plutonium Purge: Japan should either vitrify plutonium that has been separated already, or return it to stored spent fuel;

(d) Stop Plutonium Shipments: Japan should halt shipments of spent fuel to and separated plutonium from Europe and negotiate an end to plutonium reprocessing contracts in France and the United Kingdom. Japan will have to pay about $100-120 million/y to keep its spent fuel already in Europe stored there until Japan implements an interim spent fuel storage strategy. Japan could invest in industry in regions in Britain and France that will be hard hit by Japan's cancellation of contracts.

These steps would build confidence among its neighbours as to Japan's ultimate proliferation intentions and would lay the basis for a regional agreement to forego all benefits (and avoid all costs) associated with plutonium reprocessing, breeding, and use.

Of course, light water reactors using low-enriched uranium would continue to produce plutonium in spent fuel. Taking the four steps listed above would address the most urgent and important problem associated with

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Of course, light water reactors using low-enriched uranium would continue to produce plutonium in spent fuel. Taking the four steps listed above would address the most urgent and important problem associated with

plutonium production by making it maximally difficult to divert plutonium for nuclear weapons. It remains an open question whether all states in the region would be willing to accept such a scheme given the residual risks that one state might divert reactor grade plutonium in spent fuel into a weapons program.

This remaining proliferation potential raises the issue of whether it is wise to continue to rely heavily on nuclear power in Japan and South Korea, or whether eventually these programs would be phased out as plants are decommissioned while policies are implemented to maximize energy efficiency, renewable energy sources, and diversity of fossil fuel supplies. One can argue that when the plutonium reprocessing, recycle and breeder programs are shut down in the region, then the uranium-based fuel cycles will gradually collapse under their own economic weight. The quantity of spent fuel (and plutonium contained therein) that would have to be stored and eventually disposed might double or triple within two decades as a result of this approach. If an acceptable way of disposing of high level radioactive waste disposal is not identified by then, at least the plutonium in the wastes can be stringently safeguarded. It is crucial to avoid bilateral radioactive waste dumping schemes that might allow reactor grade spent fuel to be diverted (such as Japan dumping radwastes in Siberia, or South Korea in North Korea) into weapons programs.

Some Japanese nuclear industry proponents have referred hopefully to the possibility of creating a jointly managed or IAEA-controlled "international plutonium storage" facility for excess plutonium, but it seems utopian to suggest that its neighbours would enter into such an arrangement with Japan at this time.[57] Also, the United States reportedly opposes international fuel cycle schemes at the IAEA which effectively terminates a Japanese sponsored scheme in East Asia. Eventually—after plutonium has been abandoned—it is conceivable that the states in the region might create a multinational facility to deal with the waste, which would be a confidence building measure in its own right. Indeed, such a project may be urgent given the evident inability of Russia to handle its nuclear wastes in the Far East without indulging in ocean dumping.

In the next section, I examine a regional approach to containing regional proliferation potential. This approach must not only address these issues in relation to North and South Korea. It must also encompass Japan in a way that would complement the five domestic policies to rid Japan of plutonium

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57. See, for example, Takao Ishiwatari, "Plutonium Utilization in Japan," paper presented to 12th Programme for Promoting Nuclear Non-Proliferation Core Group Meeting, Shizuoka, Japan, November 28, 1992, p. 7.

outlined above. Finally, it must also include the nuclear arsenals of the great powers in the region.

Regional Denuclearisation

The global Nuclear Non-Proliferation Treaty has failed to contain nuclear proliferation in Northeast Asia. Of the six powers present in the region, three are already heavily armed with nuclear weapons. A fourth is actively pursuing a nuclear option (North Korea), and the remaining two are keeping one hand in their pocket (South Korea and Japan) with respect to medium-to long-term commitments to non proliferation. In short, the problem is not just the "creeping nuclear proliferation" by the two Koreas and Japan. The nuclear weapons of the United States, Russia and China remain the major barrier to denuclearising the Asia Pacific region, including Northeast Asia.

The Korean nuclear proliferation dynamic cannot be halted without a regional approach. By the same token, a Northeast Asian Nuclear Free Zone (NEANFZ) that effectively constrains North and South Korea's nuclear weapons potential will automatically trespass on great power nuclear weapons privileges.

Between 1971-74, US government agencies studied various approaches to a NEANFZ. These studies were in response to two issues then confronting US decision makers. The first was the popular revulsion against nuclear weapons in the region itself, especially in Japan, which created political difficulties for allied elites. The peace movement in Northeast Asia, especially organizations affiliated with the Japanese Socialist Party, have long pushed the idea of a regional NFZ, as has the North Korean Government. Until recently, these left-wing origins of the proposal rendered it politically suspect among political elites, especially in the United States and Japan. The Japanese and North Korean proposals also ignored the range of nuclear fuel cycle issues that pertain to community-based nuclear free zone concepts. A number of grass roots movements in Japan also challenged US nuclear weapons and bases in Japan at this time.[58]

The second motivation for past US studies of a NEANFZ related to geopolitical *realpolitik*. At this time, then-President Richard Nixon was devoted to restoring US centrality in world politics which entailed tilting toward China in the emerging great power triangle. Especially in Asia, he

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58. For a detailed history of the nuclear issue in Japanese politics up to the early seventies, see J. Endicott, *Japan's Nuclear Option, Political, Technical and Strategic Options* (New York; Praeger, 1975).

and then Secretary of State Henry Kissinger sought to revise the rigid lines and military commitments held over from the first Cold War. Kissinger intended to settle the Korean conflict and to pull US troops out of South Korea.

This grand design would have kept Japan dependent upon US nuclear weapons; tilted toward China in the global geopolitical triangle; and increased South Korean conventional military forces to "balance" the North's forces. (The South was secretly busily building its own bomb, to offset the US pullout and to leapfrog Japan and China to regional great power nuclear status).[59]

A US-led regional NFZ would have imposed mutual constraint nuclear arms racing by the local powers and reaffirmed US leadership. The possibility of a regional NFZ was studied in the Pentagon, the State Department, and the US Arms Control and Disarmament Agency, although the idea was shelved after Nixon's demise.[60]

In the seventies, the idea of a NEANFZ languished. In the eighties, regional NFZs were a total anathema to the Reagan and Bush Administrations. Up until mid-1991, South Korea gave periodic support for US nuclear weapons withdrawal but only after a regional NFZ had been negotiated by the regional nuclear powers. In short, it used the regional NFZ proposal to block a Korean NFZ.[61]

In the aftermath of the Cold and Gulf wars, NFZs are back on the menu in Washington although they are not yet flavor of the month, for three reasons.[62] First, the Korean Denuclearisation Declaration in 1991 relegitimated the notion of national nuclear-free zones which the United States had rejected outright in the case of New Zealand, and made it possible to consider again a regional NFZ as the latter is compatible with the former. Second, the North

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59. For a detailed account of the internal and interstate politics of this US demarche, see P. Hayes, "Inflexible Response," *Pacific Powderkeg, American Nuclear Dilemmas in Korea* (New York; Free Press, 1990), p. 46.

60. See P. Colm *et al, The Reduction of Tension in Korea*, volume 1, ACDA IR 222, Institute of Defence Analyses, Arlington Virginia, 1972; and W. Cunningham, *Arms Control in Northeast Asia* Case Study, 14th Session, Seminar in Foreign Policy, Washington DC, May 1972; both declassified under a US Freedom of Information Act request to Nautilus Pacific Research.

61. In June 1991, for example, then South Korean President Roh Tae Woo said that US nuclear strategy should be revised "only if the Soviet Union, China and the United States agreed on a nuclear-free pact for all of Northeast Asia." Cited in D. Sanger, "Seoul Says North is Moving Forward," *New York Times*, June 14, 1991.

62. See, for example, the remarks by Thomas Robinson of the American Enterprise Institute in favor of a regional NFZ for Northeast Asia in "Confidence-Building Measures Versus Conflict Laden Scenarios in Post-Cold War Korea," paper to Institute of East Asian Studies Conference, Korean options in a Changing International Order, Berkeley, California, December 11, 1991, p. 8.

Korean decision to reject the NPT as unequal and discriminatory suggests that at the very least, the NPT may require a regional buttress to work in Northeast Asia; and that at worst, a regional NFZ may be a necessary substitute for the NPT. Third, the three existing regional nuclear armed states (the United States, Russia, and China) are all modernising and rehabilitating nuclear weapons, even as obsolete and destabilising nuclear weapons are decommissioned and dismantled.[63]

Thus, it is now possible that Washington and regional capitals such as Seoul might support a NEANFZ if their interests are served by a regional NFZ or a related regional security forum in which such issues are resolved. Collective security arrangements such as a NFZ may be very attractive to officials of the Clinton Administration who face severe budgetary constraints on the military forward deployment necessary for nuclear alliances.[64]

It is urgent therefore that this issue be analysed at a regional level.[65] In addition to the nuclear issues in Korea, a regional NFZ offers a way to put pressure on China (that supports arms control and disarmament by everyone but itself), Japan (over its reprocessing program), the United States (for nuclear withdrawal from Guam, Japan, Okinawa, and the Aleutians), and Russia (likewise from the Far East and North Pacific). A common framework to monitor and verify compliance with various commitments would be the most important innovation associated with a regional NFZ.

An effective NFZ would also address non-weapons nuclear issues (such as radioactive waste dumping and LWR spent fuel production); dual capable weapons activities (such as ballistic missile testing); and seek maximum constraints over remaining nuclear and related operations and preparations that affect the region.

Other than insisting that North Korea observe its NPT obligations and dismantle its reprocessing plant, Japan has no regional non-nuclear strategy.

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63. See E. Schmitt, "Head of U.S. Nuclear Force Plans for World of New Foes," *New York Times*, February 25, 1993, p. 1; and F. Hiatt, "In Russia, signs point to a shift in N-attitudes," *Korea Herald*, November 26, 1992, p. 5.

64. I. Claude *et al*, *Collective Security in Europe and Asia*, Strategic Studies Institute, US Army War College, Carlisle Barracks, Pennsylvania, March 1992; T. Wilborn, *How Northeast Asians View Their Security*, Strategic Studies Institute, US Army War College, Carlisle Barracks, Pennsylvania, August 1991.

65. See Seong W. Cheon, "Nonproliferation, North Korea and Northeast Asian Security," paper to international seminar on *The UN and Pacific Security*, Chinese People's Association for Peace and Disarmament and University of Bradford UK, Beijing, November 2, 1993; Kim Tae Wook "Nuclear Issues and the Future of ROK-US Relations," paper to 5th KIDA/CSIS International Defense Conference on New World Order and Security of Asia Pacific region, Seoul, October 13, 1992, p. 20; Hajime Izumi, "Japan and the Korean Peninsula, The Idea of "Northeast Asia Nuclear Non Proliferation Zone," paper to 1st Northeast Asia Defense Forum, KIDA, Seoul, November 3, 1993.

Phasing out plutonium as the centerpiece of its national energy strategy would initiate an effective Japanese non nuclear diplomacy in the region.