

# JAPAN'S PLUTONIUM POLICY: CONSEQUENCES FOR NONPROLIFERATION

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Preventing the proliferation of weapons of mass destruction is one of the most serious challenges confronting the post-Cold War world.<sup>2</sup> While the danger of global nuclear war involving an exchange of strategic nuclear missiles between the superpowers and their allies has diminished, we face new kinds of threats posed by "rogue states" and non-state actors (such as organized terrorists).<sup>3</sup> Despite some recent achievements on the arms control and nuclear nonproliferation fronts, including the conclusion of the 1991 Strategic Arms Reduction Treaty (START I), the indefinite extension of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1995, and the 1996 vote of the United Nations General Assembly to adopt the Comprehensive Test Ban Treaty (CTBT), the spread of nuclear, biological, and chemical weapons and the missiles to deliver them presents a major threat to regional and global

peace and stability.

Many people tend to believe that Japan, as the world's only nation to have suffered the terrible consequences of atomic bombing, should naturally be in a unique position to play a leading role in promoting arms control and disarmament and in strengthening the global nonproliferation regime. Prime Minister Ryutaro Hashimoto expressed this view before the General Assembly of the United Nations:

In order to maintain international peace and stability, it is essential to further promote disarmament efforts and to strengthen the regime for the non-proliferation of weapons of mass destruction. In particular, Japan [should] vigorously emphasize the importance for the international community of promoting realistic and steady efforts for nuclear disarmament with the aim of realizing a world free of nuclear weapons. As the only country to have suf-

fered nuclear devastation, Japan has been making precisely this appeal to the international community as a top priority in accordance with its own philosophy.<sup>4</sup>

Indeed, Tokyo has been devoting considerable diplomatic efforts to curbing the proliferation threats stemming from the dismantling of the former Soviet Union's nuclear arsenal and North Korea's nuclear program. In each of these cases, Tokyo has been committed to providing financial and technical assistance. Japan also appeals to nuclear weapon states to fulfill their obligations to carry out nuclear disarmament in accordance with Article VI of the NPT.

Yet there are some serious impediments to Japan's playing a leading role in the field of nonproliferation. I argue that the principal impediment is Japan's pursuit of a plutonium-based, autonomous nuclear fuel cycle with independent reprocessing

capabilities and commercial breeder reactors. At a time when most of the Western democracies, including the United States, have abandoned civilian plutonium programs not just for nonproliferation reasons but for economic, environmental, and wider security reasons, Japan remains the most strongly committed to recycling plutonium and uranium for its nuclear energy programs. Unless Japan takes nonproliferation more seriously and rethinks its plutonium policy in a fundamental way, it could inadvertently encourage the stockpiling of plutonium, not just in Japan but also in the region, thereby undermining the global nonproliferation regime.

The first part of this article lays out the different policy contexts for analyzing Japan's decisionmaking: the global nonproliferation regime and U.S. nonproliferation policy, and regional energy policy, particularly the future make-up of East Asia's energy supply. The second part of the article discusses Japan's plutonium policy from a domestic perspective, focusing on current rationales and future plans. Finally, the article offers a set of policy considerations for Japanese decisionmakers, weighing the possible costs and benefits of the plutonium policy against broader nonproliferation implications.

## INTERNATIONAL POLICY CONTEXTS

### Nonproliferation Issues

It is widely recognized that plutonium is one of the most dangerous materials on earth. Plutonium separated from reprocessing of spent fuel can be used to produce nuclear weapons. As one specialist warns:

Ten pounds are enough to make a crude nuclear weapon; 1/30,000<sup>th</sup> of an

ounce will cause cancer if inhaled. Plutonium's lethality is measured in millennia, not decades or days. Its most prevalent form has a half-life of 24,000 years.<sup>5</sup>

Since the knowledge required to make nuclear weapons is readily available even at the local public library, the control of plutonium supplies is fundamental to the prevention of nuclear weapon proliferation. There are 22 countries that possess or control separated plutonium in the world today. Approximately 1,000 metric tons exist at present: about 260 tons of that stockpile are in deployed or surplus nuclear weapons; some 650 tons exist in commercial programs.<sup>6</sup> According to recent projections, plutonium in spent fuel will increase rapidly, amounting to almost 1,400 metric tons by the end of this decade.<sup>7</sup>

There are two critical problems associated with plutonium accumulation. One problem concerns the growing accumulation of plutonium from dismantled nuclear weapons as the START agreement is being implemented in the United States and the former Soviet Union. There have been reports from the former Soviet Union of thefts and illegal transfers of fissile materials, involving small quantities of weapons-grade material. To address these problems, the United States launched the Nunn-Lugar/Cooperative Threat Reduction program, in which the United States assists Russia, Ukraine, Belarus, and Kazakhstan with the secure storage, transportation, and dismantling of nuclear (and chemical) weapons. The United States also arranged to purchase 500 metric tons of enriched uranium from dismantled Russian nuclear weapons.<sup>8</sup>

The other critical problem con-

cerns the increasing plutonium stockpile produced by the civilian reprocessing of spent reactor fuel. It is important to note here that a clear distinction must be made between civil nuclear power in the once-through fuel cycle and that in the complete fuel cycle, where spent fuel is reprocessed and fissile material such as plutonium is separated from spent fuel.<sup>9</sup> It is the latter case that raises significant proliferation concerns.

Civilian reprocessing causes problems primarily in those few countries that continue to use the complete fuel cycle, although these countries (Britain, France, Russia, Belgium, and Japan) are parties to the NPT and, therefore, are subject to safeguards carried out by the International Atomic Energy Agency (IAEA). The United States, as discussed below, ended plutonium recycling in the late 1970s for nonproliferation reasons. Four countries—Japan, Russia, China, and India—are reportedly committed to pursuing research and development on nuclear breeder reactors. Significantly, the United States, Britain, Germany, and most recently, France, have stopped fast-breeder reactor development because of its lack of economic viability and public opposition.

The NPT and the IAEA constitute the core of today's nuclear nonproliferation regime, yet the fact remains that no international regime exists to prevent the accumulation of plutonium. The NPT allows parties to the treaty to acquire, produce, use, or transport plutonium and highly enriched uranium if they are subject to IAEA safeguards.<sup>10</sup>

Nevertheless, the control of plutonium nevertheless has been a major concern for American

nonproliferation policy since the late 1970s. During the Ford and Carter administrations, Washington took the position of discouraging the reprocessing and recycling of plutonium, while endorsing the use of nuclear power by the states for peaceful purposes “even if reprocessing and recycling of plutonium are found to be unacceptable.”<sup>11</sup> In March 1977, President Carter issued Presidential Directive/NSC-8, which required the United States to defer indefinitely the commercial reprocessing and recycling of plutonium in the country. President Carter also tried in vain to persuade Japan, France, Britain, and Germany to do likewise. In 1978, the United States enacted the Nuclear Non-Proliferation Act, which required the president to revise existing nuclear agreements to make them more stringent and effective.

On September 27, 1993, President Clinton announced the “Nonproliferation and Export Control Policy,” which aims to establish a framework for U.S. efforts to prevent proliferation. As key elements of this new policy, the United States pledged to:

- Seek to eliminate where possible the accumulation of stockpiles of highly enriched uranium or plutonium and to ensure that, where these materials already exist, they are subject to the highest standards of safety, security, and international accountability;
- Propose a multilateral convention prohibiting the production of highly enriched uranium or plutonium for nuclear explosives purposes or outside international safeguards;
- Encourage more restrictive regional arrangements to constrain fissile material production in regions of instability and high proliferation risk;
- Submit U.S. fissile material no longer needed for our

deterrent to inspection by the International Atomic Energy Agency;

- Pursue the purchase of highly enriched uranium from the former Soviet Union and other countries and its conversion to peaceful use as a reactor fuel;
- Explore means to limit the stockpiling of plutonium from civil nuclear programs and seek to minimize the civil use of highly enriched uranium;
- Initiate a comprehensive review of long-term options for plutonium disposition, taking into account technical, nonproliferation, environmental, budgetary and economic considerations.<sup>12</sup>

Although the Clinton administration, like previous administrations, does not encourage the use of plutonium by other countries, it “will maintain its existing commitments regarding the use of plutonium in civil programs in Western Europe and Japan.”<sup>13</sup> This means that Washington will continue, at least in the short- and mid-term, to acquiesce in Japan’s nuclear fuel reprocessing and commercial breeder reactor programs. But in the longer term, and especially given the post-Cold War context—where nonproliferation is considered to be America’s top foreign policy priority—the United States is likely to become far more stringent in pursuing its nonproliferation policy and therefore more likely to find Japan’s plutonium policy objectionable.

### The Energy Policy Context

One of the key goals of energy policy is ensuring stable and economically viable supplies of energy resources. In East Asia, where rapid industrialization has been underway and is likely to continue well into the 21<sup>st</sup> century, there will be an accelerating demand for energy sup-

plies—oil, natural gas, coal, and nuclear energy. Accordingly, states in the region are likely to compete intensely to secure reliable energy supplies. This scenario is supported by the chronic long-term shortage of oil and the on-going economic growth of China and the rapidly industrializing economies of South Korea, Taiwan, Hong Kong, Singapore, Thailand, Malaysia, and Indonesia. In particular, China became a net oil importer in November 1993; and Indonesia, a long-standing oil producing nation, is likely to become a net oil importer around 2003.<sup>14</sup>

Princeton University’s Kent Calder (now in the U.S. government) has argued that the rapidly changing energy equation in East Asia has far-reaching political and economic consequences, thus posing “unsettling dilemmas” for Asia.<sup>15</sup> First, Japan, which accounted for 77 percent of total Asian oil imports in 1992, will be in a growing competition for energy imports with South Korea, China, and the Association of Southeast Asian Nations (ASEAN). As a result, Japan’s *share* of oil imports will be reduced to less than 37 percent by 2010.<sup>16</sup> Second, the future Asian energy equation will make Asia far more dependent on the politically volatile Middle East. According to estimates of the University of Hawaii’s East-West Center, by the year 2000, 87 percent of the oil East Asian countries import will come from the Middle East, up from 70 percent today.<sup>17</sup> Third, the disputed territorial claims in the South China Sea and the Senkaku Islands and conflicting resource claims in the East China Sea remain a source of potential conflict.<sup>18</sup> A fourth and final destabilizing element in the Asian energy equation is “an increasing regional reliance on nuclear energy,

only imperfectly offset by stabilizing regulatory frameworks.”<sup>19</sup> At present, East Asia’s share of global installed nuclear capacity is quite modest, roughly 14 percent. But according to U.S. Department of Energy estimates, Asia could provide 48 percent of the entire increase in global nuclear capacity between 1992 and 2010.<sup>20</sup>

East Asia is perhaps the only region in the world where nuclear energy is increasingly viewed as a substitute for fossil fuel resources.<sup>21</sup> Japan, South Korea, and Taiwan rely on nuclear power to supply at least a quarter of their total electricity: as of 1995, South Korea’s nuclear power supplies 36.1 percent; Taiwan’s 28.8 percent; and Japan’s 33.8 percent of total power needs. China depends on nuclear power for 1.2 percent of total power generation, though it has plans to increase this share substantially.<sup>22</sup> North Korea has a research reactor and a reprocessing plant, but these facilities are frozen under the 1994 Agreed Framework with the United States. It is expected that two 1,000 megawatt (MW) light water reactors (LWRs) will be supplied by the Korean Peninsula Energy Development Organization on or around the year 2003, following the groundbreaking ceremony at Sinpo in August 1997.<sup>23</sup> Indonesia and Thailand have plans to use nuclear power by early in the next century.

Many critics of the use of nuclear power for electricity generation note unsafe plant operation, problems associated with the disposal of nuclear waste, the high capital costs of nuclear power plants, and the risks of proliferation and terrorism. Concerning the relative costs of nuclear versus fossil fuels, the IAEA observes that:

Nuclear electricity generation competes best in countries which lack cheap indigenous energy resources and which have the means and commitment to pursue a consistent nuclear power programme, such as France, Japan and the Republic of Korea. However, the competitive margin of nuclear electricity is small or may disappear where cheap fossil fuel is available.<sup>24</sup>

In sum, the rising energy demands in East Asia, driven by the region’s rapid economic growth, will have economic and security implications. In particular, the emerging energy equation involving Japan, China, two Koreas, and ASEAN will spur the use of nuclear energy for electricity generation in the region. What is not clear at this juncture is whether or not Japan’s East Asian neighbors will follow its example in the pursuit of nuclear fuel recycling and commercial fast-breeder reactors.

## THE DOMESTIC POLICY CONTEXT

### Japan’s Plutonium Policy

Japan’s reliance on nuclear energy is quite substantial, with one-third of its total electricity supplied from nuclear sources. There are 51 nuclear reactors currently in operation, and four new reactors under construction. Japan’s total installed electricity capacity is approximately 42 gigawatts, the third largest in the world after the United States and France.<sup>25</sup>

The Japanese Atomic Energy Commission (JAEC), established in 1956 within the Prime Minister’s Office, plays a key role in formulating long-term programs for research, development, and utilization of nuclear energy. The Nuclear Safety

Commission (NSC) is an advisory body to the prime minister on safety issues relating to nuclear reactors. Among the government ministries and agencies involved in Japan’s nuclear energy programs, the Science and Technology Agency (STA), the director-general of which heads the JAEC, and the Ministry of International Trade and Industry (MITI) play major roles in planning, promoting, and implementing Japan’s nuclear energy programs. Two national organizations, the Power Reactor and Nuclear Fuel Development Corporation (PNC) and the Japan Atomic Energy Research Institute (JAERI), undertake research and development for nuclear energy in close collaboration with commercial utilities.<sup>26</sup>

Japan justifies its plutonium policy on the grounds of its long-term energy security, the projected long-term economic viability of nuclear power with reprocessing, and the purported environmental benefits.<sup>27</sup> Given Japan’s poor energy resource endowment and its dependence on imports for more than 83.6 percent of its energy resources (including almost 100 percent of its oil, 94.4 percent of coal, and 96.0 percent of natural gas supplies), Japan feels extremely vulnerable to possible supply interruptions.<sup>28</sup> Added to this perception is the worrisome prospect that the world’s fossil fuels—such as oil and natural gas—and uranium (assuming no recycling of nuclear fuel) may run out at some point in the next century.<sup>29</sup> As for the economic viability of plutonium reprocessing, Japanese policymakers argue that plutonium reprocessing contributes to long-term price stability in nuclear-generated electricity, although plutonium reprocessing might be more costly than the once-through option.<sup>30</sup> A

third rationale for Japan's plutonium policy is that the volume of vitrified high-level waste from reprocessing will be smaller than the volume of the spent fuel itself, thus making it less burdensome to manage problems associated with radioactive waste.<sup>31</sup>

Japan has long been committed to a plutonium-based complete nuclear fuel cycle with reprocessing capabilities and the development of commercial breeder reactors. In 1956, the basic goal of Japan's nuclear reactor and fuel cycle development was set out in a JAEC report:

...it is our basic policy to conduct reprocessing using domestic technology as much as possible and [this] will be exclusively done by [the] Japan Atomic Fuel Public Corporation.... Mainly [for] effective utilization of nuclear fuel resources, [the] breeder reactor is the most appropriate type of reactor for Japan, thus it is our basic goal to develop...[this] type of reactor....<sup>32</sup>

In 1967, the JAEC specified the nation's long-term nuclear energy goals, including development of fast-breeder reactors and a complete nuclear fuel cycle through enrichment and reprocessing in Japan. The government created the PNC in the same year to be a key organization to carry out research and development in plutonium utilization technologies

The JAEC has published long-term programs almost every five years, and these modify some elements of the previous programs; but "the basic direction and principles of the plutonium programs have not changed since 1967."<sup>33</sup> Based upon these long-term nuclear energy goals, a wide range of policies have been formulated and implemented. Five major policy developments deserve

close scrutiny here.

The first is the development of fast-breeder reactors, which was to be carried out in four stages: experimental reactor development, prototype reactor development, demonstration reactor displays, and commercial fast-breeder reactors. The experimental fast-breeder reactor "Joyo," at Oharai in Ibaraki Prefecture, reached initial criticality (e.g., achieved a sustained chain reaction) in 1977. The prototype fast-breeder reactor "Monju" at Tsuruga in Fukui Prefecture went critical in 1994. The latest "Long-Term Program for Research, Development and Utilization of Nuclear Energy" envisages further research and development in fast-breeder reactors, but the future prospects are uncertain, because of the December 1995 accident at the Monju fast-breeder nuclear reactor involving the leak in its sodium cooling system.<sup>34</sup> The Monju plant is shut down for at least three years. The planned reprocessing and breeder reactors such as the Rokkasho-mura breeder reactor have been postponed into the next century.

Second, Japan has been developing technologies for complete nuclear fuel recycling by using uranium/plutonium mixed oxide (MOX) in LWR and the so-called advanced thermal reactors (ATR). The experience in the use of MOX fuel has been gained through the prototype ATR "Fugen," at Tsugaru in Fukui, and the "Purusamaru" (plutonium thermal use) plan envisages greater use of MOX fuel in LWRs.<sup>35</sup> Nevertheless, the planned construction of the ATR demonstration reactor has been canceled because of the projected high costs and the availability of alternatives such as the use of MOX in LWR.<sup>36</sup>

Third, Japan has been increasing its domestic nuclear reprocessing capability. However, because of its limited capacity and the political difficulties of finding sites for nuclear facilities, Japan has been relying on European companies for reprocessing. The reprocessing plant at Tokai in Ibaragi Prefecture has been reprocessing spent fuel since 1981, though its operation was temporarily stopped after the fire and explosion in March 1997. A commercial-size reprocessing plant has been under construction since 1993 at Rokkasho in Aomori prefecture. To meet the growing anticipated demand for plutonium, Japanese utilities contracted with COGEMA of France and British Nuclear Fuel Ltd. (BNFL) of the United Kingdom to extract and return the plutonium and high-level radioactive waste (HLW) that would be recovered from spent fuel. The shipment of plutonium and HLW from Europe to Japan, however, has raised international concerns about safety and the risks of terrorism.<sup>37</sup>

Fourth, in view of the growing proliferation concerns about Japan's nuclear fuel recycling program, Tokyo pledged in 1991 that it would adhere to the principle of not retaining surplus plutonium. To this end, the JAEC published an official estimate of a plutonium supply/demand balance by 2010. Since 1994, the JAEC has been publishing annually the inventory of separated plutonium to increase the transparency of the plutonium programs.<sup>38</sup> As of December 1995, the total inventory of separated plutonium managed by Japan was 16.1 tons, with 4.7 tons in Japan and 11.4 tons in Europe.<sup>39</sup>

Fifth and finally, Japan has been promoting international cooperation in the field of nuclear energy re-

search and development both at the bilateral and multilateral level.<sup>40</sup> Yet Tokyo remains undecided about various proposals for an "ASIATOM" or "PACATOM" (modeled on the European Atomic Energy Community or EURATOM) put forth by former officials and policy advisors.

Atsuyuki Suzuki of the University of Tokyo has proposed the creation of two regional institutions: the East Asian Collaboration for Intermediate Storage (EACIS) would be an international facility for immediate storage of spent fuel produced in the region; and the East Asian Collaboration for Underground Research (EACUR) would be an international facility for research on underground geological nuclear waste disposal.<sup>41</sup> Former Japanese Ambassador Ryukichi Imai argues for the creation of joint facilities for uranium enrichment and plutonium use, as well as agreements about quality control and safety standards for the construction and operation of nuclear plants.<sup>42</sup> Kumao Kaneko, a former official of the Foreign Ministry, advocates the creation of an Asia Atomic Energy Organization. Kaneko's version of ASIATOM would include "regional centers for nuclear fuel cycle services, including waste storage, management, reprocessing, and enrichment," as well as "regional safeguards and inspection systems complementing the functions of the IAEA on a regional basis."<sup>43</sup>

Some American specialists also advocate the creation of a regional nuclear cooperation regime. Robert Manning proposes the creation of PACATOM; its key functions would be improvement of safeguards standards and practices; cooperation on measures to enhance nuclear safety, research, and development; and the

storage and management of spent fuel.<sup>44</sup> Jor-Shan Choi argues for an East Asian Regional Compact (EARC) for nuclear cooperation to allay proliferation concerns through "effective spent fuel and radioactive waste accounting, management and disposal."<sup>45</sup>

These ideas have been raised and discussed in the nascent regional mechanisms for "track-two diplomacy," such as the Conference on Security Cooperation in the Asia-Pacific (CSCAP), a region-wide forum involving regional security research institutions, and the Northeast Asia Cooperation Dialogue (NEACD) organized by the University of California's Institute on Global Conflict and Cooperation (IGCC).

### **Problems and Policy Implications**

There are a host of far-reaching problems associated with Japan's nuclear programs.<sup>46</sup> The primary focus of this article is the international implications of Japan's plutonium policy; other issues such as the future domestic politics of Japan's nuclear energy policy, the nuclear energy policymaking structure and process, and the technical aspects of nuclear policy deserve separate research.<sup>47</sup>

An initial problem with Japan's plutonium policy is its official rationales, namely long-term energy security, economic viability, and environmental benefits. As for economic viability, Manning argues that:

The bottom line is that, for the foreseeable future, little economic rationale exists for commercial breeder reactors. The MOX fuel Japan now buys is 3-6 times more expensive than conventional reactor fuel, yet the glut of uranium likely to exist for at

least another 50-75 years could ensure a steady supply of fuel for Japan's power reactors. Moreover, it is quite possible that breakthroughs in fusion could alter the future of nuclear power or that other commercially viable alternative energy sources will emerge.<sup>48</sup>

Skolnikoff, Suzuki, and Oye also point out that: "...a massive commitment to plutonium and breeder reactors in commercial programs could paradoxically make Japan increasingly vulnerable to major accidents, terrorism incidents, or policy changes elsewhere over which the nation has no control."<sup>49</sup>

A second problem has to do with the "demonstration effect" of Japan's plutonium policy. If neighbors such as North and South Korea, Taiwan, and China follow Japan's example in their nuclear energy policies, this would make regional proliferation inevitable. This result would not only undermine nonproliferation norms but also, as Manning writes, engender "a 'virtual' nuclear arms race—that is, a competition between countries that have the capability to build nuclear weapons."<sup>50</sup> Indeed, China and South Korea would be tempted to embark upon development of an indigenous reprocessing capability and fast-breeder reactors.<sup>51</sup>

A third problem concerns safety in the management of nuclear facilities and radioactive waste and in the transport of plutonium. Accidents caused by human error, technical problems, or even natural disasters, such as earthquakes, cannot be ruled out. Indeed, a series of worrisome accidents occurred recently, including the December 1995 accident at the Monju fast-breeder nuclear reactor, the March 1997 fire and ex-

plosion at a nuclear fuel reprocessing plant in Tokai, the April 1997 radioactive leakage at the Fugen plant in Tsuruga, and the August 1997 revelations about radioactive leakage over a period of 30 years from waste storage pits at the reprocessing plant in Tokai. These accidents have seriously undermined public confidence in the management of nuclear plants due to official cover-ups of the accidents.<sup>52</sup>

The shipment of 1.3 tons of plutonium from a French reprocessing plant, which took almost four months to travel around the globe by sea, raised additional questions about the implications of Japan's plutonium policies for nuclear proliferation. *The New York Times* editorialized that "Japan has long professed to abhor nuclear arms. Yet it is needlessly raising the risks of proliferating nuclear arms by choosing plutonium to fuel its nuclear power plants."<sup>53</sup>

Fourth, Japan's aggressive pursuit of a nuclear fuel recycling policy could become a source of conflict with the United States. There is a salient difference in nuclear energy policy between Japan and the United States. During the Cold War, Japan's strategic value for U.S. national interests outweighed America's concern for nonproliferation. A case in point here is the revised 1988 U.S.-Japan Nuclear Cooperation Agreement, in which Washington made a concession to Tokyo by giving comprehensive approval for Japan's plutonium programs for the following 30 years.<sup>54</sup>

In the post-Cold War world, however, the United States is likely to become far more stringent in pursuing its nonproliferation policy and is likely to view Japan's plutonium policy as increasingly problematic.

Finally, Japan's commitment to the use of plutonium provokes strong suspicions in the international community about Japanese intentions. Indeed, there have already been apprehensions about the possibility of Japan eventually "going nuclear."<sup>55</sup> While the legal and political constraints against the Japanese nuclear option remain formidable, Japan's technological potential—with its large stockpiles of on-hand plutonium—make its neighbors acutely watchful of Japan's defense policy and the direction of its plutonium program.<sup>56</sup>

### CONCLUSION: CONSIDERATIONS FOR JAPANESE POLICYMAKERS

Japanese energy policymakers face the inevitable dilemma of whether to opt for the nuclear fuel cycle or to defer it. Increasingly, concerns about proliferation have to be weighed against political, economic, and environmental considerations. The evidence presented here suggests that Japan should take nonproliferation more seriously and rethink its plutonium policy. Otherwise, it could inadvertently precipitate plutonium stockpiles in the broader East Asian region, thereby seriously undermining the global nonproliferation regime, as well as Japan's own security. With increasing plutonium stockpiles on hand, Japanese policymakers are likely to be plagued by accidents in nuclear plants and by prospects for possible terrorist incidents. Moreover, the persistent apprehensions about Japan's nuclear intentions are bound to increase in the international community.

In view of the growing proliferation concerns discussed above, Japanese policymakers should adopt some of the following policy recom-

mendations:

First, Japan should consider deferring its nuclear recycling policy and the development of fast-breeder reactors until uncertainties about the proliferation dangers are resolved. Research and development on nuclear power, however, could be continued.

Second, Japan should take a more active role in creating a regional nuclear cooperation regime, such as the PACATOM proposed by Manning.<sup>57</sup> The idea is not to legitimize nuclear fuel reprocessing in the region, but to promote a multilateral dialogue on nonproliferation and confidence-building measures, including safety measures, and nuclear waste management. Regional crisis management centers could also be established to reduce the consequences of accidents and to promote regional cooperation in dealing with them.

Finally, Japan should further strengthen the transparency of its nuclear energy programs and encouraging an informed public debate.<sup>58</sup> Reorganization of the existing nuclear energy policymaking structure would be needed. It is imperative that Japanese legislators, as well as the Japanese public, acquire an understanding of nonproliferation and the proliferation implications of Japan's plutonium policy.

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<sup>2</sup> "Proliferation" here refers to "the spread of nuclear, biological and chemical capabilities

and the missiles to deliver them"; and "non-proliferation" is "the use of the full range of political, economic and military tools to prevent proliferation, reverse it diplomatically or protect our interests against an opponent armed with weapons of mass destruction or missiles, should that prove necessary." See Daniel Poneman, Special Assistant to the President, Memorandum "Agreed Definitions," February 18, 1994. (Reprinted in U.S. Library of Congress, Congressional Research Service, *Nuclear Proliferation Factbook*, prepared for the Committee on Governmental Affairs, United States Senate (Washington, D.C.: U.S. Government Printing Office, 1995), p. 205).

<sup>3</sup> See John F. Sopko, "The Changing Proliferation Threat," *Foreign Policy* 105 (Winter 1996-97), pp.3-20.

<sup>4</sup> "Statement by Prime Minister Ryutaro Hashimoto at the 51st Session of the General Assembly of the United Nations, New York, September 24, 1996" ([http://www.mofa.go.jp/f\\_m/hashimoto/sp\\_un.html](http://www.mofa.go.jp/f_m/hashimoto/sp_un.html)).

<sup>5</sup> George Perkovich, "The Plutonium Genie," *Foreign Affairs* 72 (Summer 1993), pp. 153-165.

<sup>6</sup> *Ibid.*

<sup>7</sup> Robert A. Manning, "Rethinking Japan's Plutonium Policy: Key to Global Non-Proliferation and Northeast Asian Security," *Journal of East Asian Affairs* 9 (Winter/Spring 1995), p. 116.

<sup>8</sup> See, for example, Zachary Davis, "Nuclear Nonproliferation Policy Issues in the 104th Congress," *CRS Issue Brief* 91-23 (updated November 1, 1996).

<sup>9</sup> Robert A. Manning, "PACATOM: Nuclear Cooperation in Asia," *The Washington Quarterly* 20 (Spring 1997), p. 218.

<sup>10</sup> It should be noted here that deficiencies exist in IAEA safeguards such as the IAEA's inability to inspect against undeclared nuclear facilities or activities. See Kurosawa Mitsuru, ed., *Gunshukumonndai nyumon* (Issues in Disarmament: An Introduction) (Tokyo: Toshindo, 1996), Chapter 2; see also Henry Sokolski, "Nonproliferation: The Last 50 Years," paper presented at the American Political Science Association Annual Meeting, August 30, 1996, Chicago.

<sup>11</sup> See "President Ford's statement on nuclear policy," October 28, 1976. (Reprinted in U.S. Library of Congress, Congressional Research Service, *Nuclear Proliferation Factbook*, pp. 48-62).

<sup>12</sup> See White House, Office of the Press Secretary, September 27, 1993, "Fact Sheet: Non-Proliferation and Export Control Policy." (Reprinted in U.S. Library of Congress, Congressional Research Service, *Nuclear Proliferation Factbook*, pp. 195-196).

<sup>13</sup> *Ibid.*, pp. 91-95; see also Kent E. Calder, *Pacific Defense: Arms, Energy, and America's Future in Asia* (New York: William Morrow and Company, 1996) and his "Asia's Empty Tank," *Foreign Affairs* 75 (March/April 1996), pp. 55-69.

<sup>14</sup> Kent E. Calder, "Policy Forum: Energy Futures," *The Washington Quarterly* 19 (Autumn 1996), p. 93.

<sup>15</sup> *Ibid.*, pp. 91-95.

<sup>16</sup> *Ibid.*, pp. 92-93.

<sup>17</sup> Calder, *Pacific Defense*, p. 59.

<sup>18</sup> Calder, "Policy Forum....," pp. 93-94.

<sup>19</sup> *Ibid.*, pp. 94-95.

<sup>20</sup> *Ibid.*

<sup>21</sup> See Tatsujiro Suzuki, "Lessons from EURATOM for Possible Regional Nuclear Cooperation in the Asia-Pacific Region (ASIATOM)," paper presented at the Northeast Asia Cooperation Dialogue meeting, Beijing, January 8-10, 1996.

<sup>22</sup> Genshiryokuinikai (Japan Atomic Energy Commission), *Genshiryoku hakusho* (White paper on Nuclear Energy)(Tokyo: Okurasho insatsukyoku, 1997), p. 111 and pp. 142-144.

<sup>23</sup> *Asahi Shimbun*, August 20, 1997, p. 5.

<sup>24</sup> *IAEA Yearbook 1994*, p. 12, cited in Michael Wilson, *The Nuclear Future: Asia and Australia and the 1955 Conference on Non-Proliferation*, Australia-Asia Papers No. 74 (Queensland: Centre for the Study of Australia-Asia Relations, Griffith University, March 1995), p. 19.

<sup>25</sup> See Genshiryokuinikai (Japan Atomic Energy Commission), *Genshiryoku hakusho* (White paper on Nuclear Energy), pp. 110-111.

<sup>26</sup> See, for example, Michael W. Donnelly, "Japan's Nuclear Energy Quest," in Gerald L. Curtis, ed., *Japan's Foreign Policy After the Cold War* (New York: M.E. Sharpe, 1993), pp. 179-201.

<sup>27</sup> For detailed analyses of these points, see Eugene Skolnikoff, Tatsujiro Suzuki, and Kenneth Oye, *International Responses to Japanese Plutonium Programs* (Cambridge, Mass.: Center for International Affairs, Massachusetts Institute of Technology, August 1995), pp. 27-41.

<sup>28</sup> Japan Atomic Energy Commission, "Long-Term Program for Research, Development and Utilization of Nuclear Energy," June 24, 1994, p. 18.

<sup>29</sup> It is projected that coal reserves will be exhausted within about 200 years. See *Ibid.*, p. 10.

<sup>30</sup> Skolnikoff, Suzuki, and Oye, *International Responses to Japanese Plutonium Programs*, pp. 34-37.

<sup>31</sup> *Ibid.*

<sup>32</sup> Cited in *Ibid.*, p. 2.

<sup>33</sup> *Ibid.*, pp. 2-3.

<sup>34</sup> See Yoshinori Ihara, "Nuclear Fuel Recycling Policy for the Future," speech at the 10th Pacific Basin Nuclear Conference, October, 1996 (<http://www-atm.jst-c.gov.jp/jicst/NC/announce/961025.html>).

<sup>35</sup> Japan Atomic Energy Commission, "Toumen no kakunenryo saikuru no gutaiteki na shisaku ni tuite" (On current nuclear fuel recycling policies), January 30, 1997 (<http://www-atm.jst-c.gov.jp/jics/NC/announce/siryu02.htm>).

<sup>36</sup> Ihara, "Nuclear Fuel Recycling Policy for the Future."

<sup>37</sup> See Motoya Kitamura, "Japan's Plutonium Program: A Proliferation Threat," *The Non-proliferation Review* 3 (Winter 1996).

<sup>38</sup> Skolnikoff, Suzuki, and Oye, *International Responses to Japanese Plutonium Programs*, pp. 18-19.

<sup>39</sup> Genshiryokuinikai (Japan Atomic Energy Commission), *Genshiryoku hakusho* (White paper on Nuclear Energy), p. 77.

<sup>40</sup> *Ibid.*, pp. 263-290.

<sup>41</sup> Atsuyuki Suzuki, "A Proposal for Regional Spent Fuel Storage," *IGCC Newsletter*, Vol. 12, No. 2 (1996), pp. 8-9.

<sup>42</sup> Ryukichi Imai, "A Call for Regional Cooperation in Nuclear Energy," *Japan Review of International Affairs* 9 (Summer 1995).

<sup>43</sup> Mark Hibbs, "Japanese Say U.S. Blocking Efforts to Build Regional Fuel Cycle Links," *Fuel Cycle* 21 (November 5, 1996); see also Kaneko Kumao, *Nihon no kaku, ajia no kaku* (Japan's Nuclear Power, Asia's Nuclear Power) (Tokyo: Asahi Shimbunsha, 1997), Chapter 6 and pp. 268-281.

<sup>44</sup> See Robert A. Manning, "PACATOM: Nuclear Cooperation in Asia."

<sup>45</sup> Jor-shan Choi, "Developing a Regional Nuclear Energy Compact," *IGCC Newsletter*, Vol. 12, No. 2 (1996), pp. 8-9.

<sup>46</sup> This section draws in part on Skolnikoff, Suzuki, and Oye, *International Responses to Japanese Plutonium Programs*, and Kitamura, "Japan's Plutonium Program: A Proliferation Threat."

<sup>47</sup> For analyses of these issues, see Kitamura, "Japan's Plutonium Program: A Proliferation Threat"; Peter Dauvergne, "Nuclear Power Development in Japan," *Asian Survey* 33 (June 1993); and Richard J. Samuels, *The Business of the Japanese State: Energy markets in Comparative and Historical Perspective* (Ithaca, NY: Cornell University Press, 1987).

<sup>48</sup> Manning, "PACATOM: Nuclear Cooperation in Asia," pp. 221-222.

<sup>49</sup> Skolnikoff, Suzuki, and Oye, *International Responses to Japanese Plutonium Programs*, p. 32.

<sup>50</sup> Manning, "PACATOM: Nuclear Cooperation in Asia," pp. 222.

<sup>51</sup> China announced that it would build 50 tons per year reprocessing plant by 2000, and 400 to 800 tons per year plant by 2010 or so. See Tatsujiro Suzuki, "Lessons from EURATOM for Possible Regional Nuclear Cooperation in the Asia-Pacific Region (ASIATOM)"; Taewoo Kim, "Japanese Ambitions, U.S. Constraints, and South Korea's Nuclear Future," in Selig S. Harrison, ed., *Japan's Nuclear Future: The Plutonium Debate and East Asian Security* (Washington, D.C.: Carnegie Endowment for International Peace, 1996), pp. 87-109; and Foreign Broadcast Information Service (FBIS), Special Memorandum, "South Korea's Emerging Nuclear Potential," February 22, 1996.

<sup>52</sup> See Yomiuri Shimbun kagakubu, *Dokumento*

'*monju*' *jiko* (The Document: the 'Monju' Accident) (Tokyo: Mioshin shuppan, 1996); *Asahi Shimbun*, March 12, 1997; *Asahi Shimbun*, April 16, 1997; and *Yomiuri Shimbun*, August 27, 1997.

<sup>53</sup> *The New York Times*, November 10, 1992, p. 22.

<sup>54</sup> Nevertheless, the United States managed to strengthen its control over "sensitive technologies and material" and plutonium shipments. See Skolnikoff, Suzuki, and Oye, *International Responses to Japanese Plutonium Programs*, pp. 7-8.

<sup>55</sup> See Selig S. Harrison, "Japan and Nuclear Weapons"; Andrew Mack, *Proliferation in Northeast Asia*, Occasional Paper 28 (Washington, D.C.: Henry L. Stimson Center, 1996).

<sup>56</sup> See Kumao Kaneko, "Japan Needs No Umbrella," *The Bulletin of the Atomic Scientists* (March/April 1996).

<sup>57</sup> Manning, "PACATOM: Nuclear Cooperation in Asia."

<sup>58</sup> For a proposal on increasing transparency, see Charles W. Nakhleh, "Addressing the Implications of the Japanese Fuel Cycle through Transparency," *The Nonproliferation Review* 4 (Spring-Summer 1997).