

## International Panel on Fissile Materials (IPFM):

Developing the technical basis for policy initiatives to secure and eliminate stocks of nuclear weapons and fissile materials

30 June 2014

Open letter to Prime Minister Abe, Environment Minister Ishihara, Foreign Minister Kishida, METI Minister Motegi, MEXT Minister Shimomura, JAEC Chairperson Oka, and NRA Chairperson Tanaka on

### **Nuclear Security and Minimization of Nuclear-weapon-usable Materials (plutonium and HEU)**

Dear Ministers and Commissioners

We write you as a group of concerned European and American experts on plutonium security and spent-fuel management who have contributed to Japan's nuclear-energy policy discussions for many years.

We applaud the decision by Japan's Government, announced by Prime Minister Abe at the March Nuclear Security Summit at The Hague, to send the vulnerable plutonium and highly enriched uranium at the Tokai-mura Fast Critical Assembly to the United States for secure storage and disposal. We also appreciate the Prime Minister's description of "the minimization and appropriate management of nuclear material" as "the core issue of this Summit" and his joint statement with the President of the United States encouraging "others to consider what they can do to further HEU and plutonium minimization."

We are concerned, however, that, in its National Progress Report for the 2014 Nuclear Security Summit, Japan repeated the Japan Atomic Energy Commission's (JAEC's) year-2000 redefinition of Japan's commitment not to possess excess plutonium as "not possessing plutonium reserves for which the purpose of utilization is unspecified." This is much weaker than the JAEC's original declaration in 1991 of the "principle of not possessing more plutonium than the amount necessary in the implementation of the nuclear fuel recycling program."

The year-2000 wording makes it possible to justify amassing any quantity of separated plutonium simply by declaring a plan for its future utilization, even if the plan lacks credibility.

According to the National Progress Report, the Government authorizes reprocessing each year after "electric power companies and other operators publicly release their plutonium utilization plans. The appropriateness of the plans has been assessed by the Japan Atomic Energy Commission."

The requirement for a utilization plan, introduced by the JAEC in 2003, applies only to the plutonium to be separated at the Rokkasho reprocessing plant, however, and ignores Japan's stockpile of separated plutonium in Europe, standing now at about 34 tons. And while the JAEC policy requires that details of the timing of the use of the plutonium be declared, it now accepts utilization plans that simply state that use will follow the start up of Japan's mixed oxide (MOX) uranium-plutonium fuel fabrication plant, whose completion date keeps slipping – most recently to October 2017.

The utilities' long-standing plan (since 1997) to have 16-18 nuclear power reactors fueled with MOX fuel by 2010 was not realized. Nor have the Japan Atomic Energy Agency's plans to operate the plutonium-fueled *Monju* reactor. Currently Japan:

- Does not have single power reactor operating;
- Has succeeded since 1999 in irradiating only 2 tons of plutonium in MOX, leaving stockpiled in Europe and Japan some 45 tons of Japan's separated plutonium, sufficient for more than 5,000 nuclear bombs; and
- Does not have an operating MOX fuel fabrication plant.

As Prime Minister Abe stated, the unnecessary production and stockpiling of such nuclear-weapon-usable material is the core issue for the Nuclear Security Summits. Nevertheless, Japan Nuclear Fuel Limited plans to begin separating more plutonium at the Rokkasho Reprocessing Plant as soon as possible. JNFL's stated plan is to finish safety upgrades by October this year and begin reprocessing after it gets clearance from the Nuclear Regulation Authority and the consent of the local governments.

Plutonium separated at Rokkasho can only accumulate until the Rokkasho MOX Fuel Fabrication Plant starts functioning. There are 5.4 tons of plutonium in oxide form stored at Rokkasho and Tokai-mura that could be used to test the MOX plant – which is not guaranteed to operate. The UK MOX Fuel Fabrication Plant was abandoned in 2011 after 10 years of attempts to make it operate. The MOX plant that the U.S. is building to dispose of its excess weapons plutonium has experienced such huge cost increases that the Department of Energy is considering abandoning it. Japan is not immune to such problems. Commercial operation of the Rokkasho Reprocessing Plant has been delayed for more than a decade.

More realistic plans for dealing with Japan's huge plutonium stockpile have to be developed. In the meantime, in the absence of *credible* plans for the disposal of its existing stocks, it would be a major misstep for Japan's Government to permit the separation of more plutonium. This is why, in our December 5<sup>th</sup> statement following the Asahi-Princeton 5 December 2013 Symposium in Tokyo on Managing Spent Fuel (attached) we urged that,

“At a minimum, Japan should commit not to operate the Rokkasho reprocessing plant until its stockpile of separated plutonium is reduced to the smallest feasible working stock (about one year's consumption) and arrangements are in place for immediate consumption of the plutonium to be separated at the plant. Japan pioneered just-in-time inventory management. There are security as well as economic reasons to apply this approach to separated plutonium.”

Japan's extraordinarily costly spent fuel reprocessing policy has been rationalized by predictions, prior to the March 2011 accident, that the spent fuel pools at a few of Japan's nuclear power plants would be full in about 4 years. But shipment of the spent fuel to a reprocessing plant is not the only way to deal with that problem. Indeed, almost all other countries deal with it by moving to dry-cask storage spent fuel that has cooled in the pools for at least several years. Japan did this at the Fukushima Daiichi Nuclear Power Plant and at the Tokai Daini Nuclear Power Plant before the accident. We read with great interest a recent report that METI plans to encourage dry-cask storage at more nuclear power plants for safety reasons. This would give Japan the flexibility that it needs in spent-fuel management if it is to avoid the risks and costs associated with separating more plutonium prematurely.

We also welcome the recent statement of the chairperson of METI's technical working group on waste disposal that reprocessing is not beneficial from a waste disposal point of view. We hope that may lead to reconsideration of the Government's requirement that Japan's utilities reprocess their spent fuel. Japan is the only one of 24 non-weapon states that still reprocesses. Among the weapon states, the UK has joined the U.S. in deciding to abandon reprocessing.

We would welcome an opportunity to exchange views on these critical issues. Two of us (Janberg and von Hippel) will be in Tokyo on June 30 and July 1.

Steve Fetter, Associate Provost and Professor of Public Policy, University of Maryland, Assistant Director, White House Office of Science and Technology Policy (2009-12)

Klaus Janberg, nuclear consultant, previously, as Chief Executive Officer of GNS, managed the development and production of the casks that provide interim storage for spent fuel in Germany and a number of other countries

Gordon Thompson, specialist on radiological risk mitigation and Executive Director, Institute for Resource and Security Studies

Frank von Hippel, Senior Research Physicist and Professor of Public and International Affairs emeritus, Princeton University, co-chair International Panel on Fissile Materials

William Walker, Professor of International Relations emeritus, St Andrews University, UK.

## ATTACHMENT

### **Recommendations by the foreign participants in the Asahi-Princeton 5 December 2013 Symposium in Tokyo on Managing Spent Fuel: To Reprocess or Store?**

Separated plutonium, whether civilian or military, is weapon-usable. Japan has now 10 tons of separated plutonium inside Japan—enough for more than 1,000 nuclear weapons and five times more than China has separated for nuclear weapons. It has an additional 34 tons of plutonium stored in France and the United Kingdom. The Rokkasho plant is designed to separate an additional 8 tons of plutonium per year.

Contrary to the repeated claims by Japan's Ministry of Economy, Trade and Industry (METI), separating and recycling plutonium in light water reactor fuel does not make the spent fuel from nuclear power plants significantly less dangerous or easier to dispose of. Reprocessing and disposal of the waste from reprocessing also doubles the backend cost of nuclear power generation compared to that of interim storage and direct disposal of spent fuel. These points were made in the November 2011 report of the Japan Atomic Energy Commission fuel cycle study group.

As the only non-weapon state that reprocesses, Japan is setting an example that states interested in acquiring a nuclear-weapon option can point to as a legitimate internationally accepted activity. Separated plutonium is also a target for would-be nuclear terrorists.

We sincerely hope that Japan will end its separation of plutonium and join the United States and other countries in opposing plutonium separation worldwide. At a minimum Japan should take seriously "the importance of balancing supply and demand, including demand for reasonable working stocks for nuclear operations, as soon as practical" stipulated in the 1997 Guidelines for the Management of Plutonium, which Japan helped to formulate. Indeed in the Dec. 5, 1997 letter sent to IAEA in accordance with the guidelines, Japan pledged: "The nuclear fuel cycle is promoted based on the principle that plutonium beyond the amount required to implement the program is not to be held, i.e. the principle of no surplus plutonium. Nuclear materials are also strictly managed, so as not to give rise to any international doubts concerning nuclear proliferation."

In his press conference on 6 December, the day after the Asahi-Princeton symposium, METI Minister Toshimitsu Motegi criticized the previous government's contradictory policy of aiming at zero nuclear power by the end of the 2030s while continuing with the plan of starting the commercial operation of the Rokkasho Reprocessing Plant. He asked, "What would happen to the plutonium balance?" Minister Motegi may have had in mind a statement made by President Obama during his March 2012 visit to South Korea for the Seoul Nuclear Security Summit, "We simply can't go on accumulating huge amounts of the very material, like separated plutonium, that we're trying to keep away from terrorists!"

To avoid the plutonium imbalance that Minister Motegi is worried about, Japan should not start the Rokkasho Reprocessing Plant before reducing Japan's plutonium stockpile to a minimum. The fact that Japan was able to use as reactor fuel only 2.5 of over 40 tons of separated plutonium during the twelve years before the accident at Fukushima Daiichi suggests that, even with concerted effort, reducing the stockpile from tens of tons to tons will take more than a decade.

We offer the recommendations below in the interests of strengthening regional and global confidence in Japan's commitment to non-proliferation, improving nuclear safety and reducing the cost of electric power in Japan.

1. Minimize stocks of separated plutonium. At a minimum, Japan should commit not to operate the Rokkasho reprocessing plant until its stockpile of separated plutonium is reduced to the smallest feasible working stock (about one year's consumption) and arrangements are in place for immediate consumption of the plutonium to be separated at the plant. Japan pioneered just-in-time inventory management. There are security as well as economic reasons to apply this approach to separated plutonium. Specifically, Japan should:

- Negotiate the future of its stock of almost 18 tons of separated plutonium in the United Kingdom. The UK Department of Energy and Climate Change offered in 2011 to take title to Japan's separated plutonium in the UK "subject to ... commercial arrangements that are acceptable to UK Government".
- Ensure that France does not ship any more MOX fuel to Japan until Japan's utilities have in place concrete plans to load the fuel into their reactors upon arrival. Today, five of Japan's nuclear power plants have a total of almost two tons of plutonium in mixed-oxide (MOX) fuel from France stored insecurely in their spent fuel pools - enough for over 200 nuclear weapons. At one nuclear power plant, this fuel has been stored for twelve years!
- Join the United States in studying alternatives to MOX fuel for plutonium disposal. The U.S. has experienced huge cost over-runs in its MOX fuel program for disposing of more than 34 tons of excess Cold War plutonium and resistance from its nuclear utilities to MOX fuel use. It is now considering various alternative options for direct disposal deep underground.

2. Install dry-cask spent-fuel storage at each of Japan's nuclear power plants. The accident at Fukushima Daiichi demonstrated dramatically that dry cask storage is safer than pool storage for spent fuel that has cooled enough for air cooling to be possible. In September 2012, in his first press conference as chairman of Japan's new Nuclear Regulation Authority, Shunichi Tanaka recommended that fuel that has cooled in pools more than five years should be removed to dry cask storage. This would make it possible to store the more recently discharged fuel remaining in the pools in a safer configuration. It also would provide an alternative to shipment of spent fuel to Rokkasho, making it unnecessary to operate the reprocessing plant. The 3,000 tons of spent fuel in the intake pools of the Rokkasho Reprocessing Plant also could be transferred to safer dry cask storage, for example, in the Mutsu storage facility.

3. Upgrade the security for separated plutonium, including that in unirradiated MOX fuel. Twenty years ago, a U.S. National Academy of Sciences study recommended that separated plutonium be stored and transported with a level of security comparable to that which the U.S. provides for nuclear weapons. This is a much higher standard of security than exists for separated plutonium in Japan today.

4. Vitrify — that is, imbed in glass — the large volumes of liquid high-level reprocessing waste stored at the Rokkasho and Tokai reprocessing plants. If a significant fraction of this waste were released into the atmosphere as a result of an accident or terrorist action, it could contaminate huge areas of Japan. Vitrification on a just-in-time basis would minimize dangerous inventories of high-level liquid waste.

5. Launch studies of the packaging and siting criteria for direct disposal of spent fuel deep underground. Spent fuel storage in dry casks is a safer form of interim storage than pools. Over a period of a century or so, however, cask storage will degrade — as would surface storage for vitrified reprocessing waste. Deep storage in suitable geology 500 meters or more underground should be the long-term objective.

#### Foreign participants

- Steve Fetter, Associate Provost and Professor of Public Policy, University of Maryland, and, during 2009-12, Assistant Director at large, White House Office of Science and Technology Policy
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