Proposal
for Augmenting Funding for the Disposition of Russian Excess Plutonium

by

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Introduction

Both the United States and Russia have declared that 50 tonnes (t) of plutonium (Pu) are in excess of military needs. Russia and the United States have pledged to remove this plutonium from their respective nuclear weapons programs and dispose of it either by consuming the plutonium as fuel in existing civil reactors or through mixing the plutonium with high-level radioactive waste. On September 2, 1998, Presidents Yeltsin and Clinton agreed to begin negotiations of a bilateral agreement that will lay out concrete steps for plutonium disposition and cooperation in this area.

Given the deteriorating economic environment in Russia, it is increasing important that the United States assist Russia in insuring that fissile inventories in Russia will be secure in the event of a possibly prolonged period of socio-economic instability. In this regard the United States should seek ways of improving the physical security of storage sites and accelerate the disposition of excess plutonium and highly-enriched uranium.

Russia faces several major difficulties in disposing of its plutonium. Russia does not have a MOX fabrication plant with adequate capacity, nor funds to construct one. Various proposals for constructing a MOX fabrication plant in Russia have been floated by U.S. and Russian officials, but none nail down the financing. One proposal is for the U.S to build in Russia a plant for converting weapon-grade plutonium (WGPu) currently in the form of weapon components (i.e., "pits") into unclassified forms; and for Russia to finance the construction of a pilot MOX fabrication plant with money saved by the displaced low-enriched uranium fuel. Russia, France and Germany have a joint proposal for constructing a pilot MOX plant with a capacity of 1.3 t of plutonium annually, sufficient capacity to supply fuel for four VVER-1000 plants operating on ~1/3 MOX cores (0.25 t Pu/reactor-y) and the BN-600 with a partial MOX core loading (0.3 t Pu/y). France and Germany are interested in constructing the Russian MOX pilot plant provided that someone else pays for it.

The U.S. Congress has included $200 million in the FY 1999 budget for Department of Energy (DOE) Atomic Energy Defense Activities, "for expenditures in the Russian Federation to implement a United States /Russian accord for the disposition of excess weapons plutonium. None of these funds may be obligated until the Department of Energy submits a detailed budget justification to Congress, and the House and Senate Committees on Appropriation have approved the proposal."[1] This $200 million represents only a fraction of the cost of a MOX fabrication plant, which if built in the West would cost $500 million to $1 billion. Even taking into account credit for the cost of LEU fuel that the MOX fuel displaces, i.e., approximately $1000/kgHM, the United States is likely to incur difficulty in identifying full funding for both plutonium conversion and MOX fabrication in Russia.

[1] House Committee on National Security, FY 1999 Conference Report on H.R. 3616, No. `105-736, Chapter 2.

The 1.3 t Pu/y pilot plant has a capacity of only 37 percent of the proposed U.S. MOX plant. Moreover, Russia proposes to dispose of all of its excess plutonium by MOX, whereas the United States plans to dispose of 63 percent of its plutonium by MOX. Clearly, the Russian program is not keeping in pace with the U.S. program even on paper. Moreover, the rate of conversion of plutonium using the proposed 1.3 t Pu/y pilot MOX fabrication plant is too slow in light of the fact that Russia is currently, and plans to continue, separating plutonium from VVER-440 power reactors and three plutonium production reactors. In recent years about 2 t of reactor-grade plutonium (RGPu) were being separated annually from VVER-440 spent fuel processed at Chelyabinsk-65. Also, about 1.4 t of weapon-grade plutonium (WGPu) is being recovered annually by processing spent fuel from the three remaining plutonium production reactors—two reactors at Tomsk-7 and one at Krasnoyarsk-26. Consequently, even if the proposed pilot MOX fabrication plant were to be constructed in Russia, its 1.3 t Pu/y capacity is less than 40 percent of the rate at which Russia continues to separate plutonium. Russia plans to stop processing production reactor fuel in the year 2000, when the reactors are scheduled to shift over to a different fuel type. Even so, under current plans Russia would still be separating plutonium as fast as it is converted to MOX.

The United States may propose that Russia construct a MOX fabrication plant with a capacity substantially larger than 1.3 t Pu/y. This will lead to higher MOX fabrication plant construction cost, and will require completion of three additional VVER-1000 reactors in Russia and agreement by Ukraine and/or other countries to utilize the MOX fuel.

In sum, we do not believe current proposals for disposing of the excess Russian plutonium offers a high probably of success. There is no credible proposal for disposing of Russian plutonium in play today. No government is willing to provide full funding for a MOX fabrication plant in Russia; and even if funded, the current MOX disposition plan is too slow.

The current DOE policy is not to construct the U.S. MOX fabrication plant unless there is "significant progress with Russia on plans for plutonium disposition" by the end-FY 2000 [September 30, 2000].[2] Since it is highly probable that there will be little progress on plutonium disposition in Russia over the next several years, there may be little or no U.S. plutonium converted into MOX for years to come.

The following alternative proposal is designed to facilitate the disposition of excess Russian plutonium by producing several billion dollars of additional revenues that can be tapped to facilitate Russian plutonium disposition. This proposal takes advantage of the existence of the Non-Proliferation Trust, Inc., a Delaware corporation created to reduce the nonproliferation risks associated with the commercial use of plutonium, and the associated Minatom Development Trust.

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[2] Statement of Howard Cantor, Acting Director, Office of Fissile Material Disposition, at the Council on Foreign Relations "The Management and Disposition of Excess Nuclear Weapons Material," March 9, 1998.

The Non-Proliferation Trust was created to accept, under contract with foreign reactor owners, spent nuclear fuel and store it indefinitely in above-ground containers at a facility that Non-Proliferation Trust proposes to construct on Wake Island in the Pacific. One-half of the profits from the Non-Proliferation Trust would be used to support defense conversion activities of the Russian Ministry of Atomic Energy (Minatom), and the other half divided among five charities.[3] The profits used to support Minatom activities would be managed by the Minatom Development Trust, newly created for this purpose.

Under the following proposal, which has been approved by the Non-Proliferation Trust and its shareholders, including the Minatom Development Trust, the organizational structure and relationship between the Non-Proliferation Trust, Inc. and the Minatom Development Trust would be retained, but spent fuel is stored in Russia rather than at Wake Island.[4] Also, with the permission of the five charities all the profits of the Non-Proliferation Trust would all pass through to the Minatom Development Trust for plutonium disposition and defense conversion activities in Russia.

Outline of the Proposal

The Non-Proliferation Trust would enter into a series of contracts with the Minatom to accomplish two related tasks: i) storage, conversion and disposition of excess plutonium, and ii) storage and disposition of foreign reactor spent fuel:

a) The Non-Proliferation Trust would lease for a specified period, e.g., 20-30 years, up to 50 t of excess WGPu from Minatom.

b) The Non-Proliferation Trust would take title to foreign commercial spent fuel containing up to 50 t of fissile plutonium in return for a fee approximating the avoided cost of spent fuel storage, reprocessing and high-level waste disposal (i.e., about $1.2 million/tonne).

c) The Non-Proliferation Trust would contract with Minatom to store the foreign power reactor spent fuel for a specified period, e.g., 30 years, at Zheleznogorsk (Krasnoyarsk-26), or other suitable site agreeable to Minatom and the Trust. To accomplish this Russian Land Use Law Number 53 would have to be amended, or Russia would have to enter into an agreement with the

[3] These are the International Rain Forest and Reef Foundation, the International Children's Foundation, the American Children's Hospital Foundation, the National Family Development Foundation and the Humanitarian Foundation.

[4] The chairman of the Non-Proliferation Trust is Admiral Daniel J. Murphy, USN (Ret.), former Commander of the Sixth Fleet, Deputy Director of the CIA, Deputy Under Secretary of Defense for Policy and President Bush's Chief of Staff. Admiral Bruce DeMars, USN (Ret.), former head of the Naval Reactors, is a trustee and will be the chief operating officer. The principal trustee of the Minatom Development Trust is Judge William H. Webster, former director of the FBI and CIA.

United States to permit storage of spent fuel under the existing law. The spent fuel would be stored above ground in dual purpose dry casks under conditions equivalent to those required under license by the U.S. Nuclear Regulatory Commission. The contract would specify conditions for renegotiating the contract, including, for example, whether Minatom takes title to the spent fuel after the specified storage period.

d) The quantity of excess WGPu placed under the lease agreement would be tied to the delivery of spent fuel, where the latter is measures in terms of the amount of fissile plutonium contained therein.

e) The Non-Proliferation Trust would contract with Minatom to store the leased WGPu at the fissile material storage facility presently under construction at Ozersk (Mayak Production Association or Chelyabinsk-65). The contract would fix the maximum storage period and address the disposition of plutonium remaining at the end of the period. The Non-Proliferation Trust or its agents would have limited access to the storage facility for purposed of insuring adequate physical security and international safeguards over the plutonium leased by the Non-Proliferation Trust.

f) Income received by the Non-Proliferation Trust for spent fuel purchase or storage services, over and above that requires to pay expenses, would be managed by the Minatom Development Trust to provide Russian defense conversion assistance and dispersed in accordance with the terms of the Minatom Development Trust.

g) The contracts with Minatom for leasing the plutonium would not take precedent over any arrangements between the United States and Russia for the disposition of excess plutonium.

The above proposal offers several advantages over proposals for the disposition of Russian excess plutonium. These include:

Advantages to Russia/Minatom:

a) Considerable funds can be generated by the storage of spent fuel in Russia to make the plutonium-spent fuel swap viable. Russia would receive near-term income from the plutonium-spent fuel swap.

b) A U.S. trusteeship would control the distribution of the funds to prevent then from being misappropriated in the event of potential economic and/or political chaos in Russia.

c) There would be a potential for expanded commercial relationships with Western utilities, included an expanding market for Russian-origin uranium and enrichment services.

Advantages to the United States:

a) A United States entity would retain a level over control and disposition of the separated WGPu, and its physical security and safeguards, thus leading to increased control over the security of Russian excess plutonium.

b) A private entity could operate more efficiently and expeditiously than the federal government.

c) Provides a commercial flow of funds to support plutonium disposition in Russia.

d) Increases Russia's stake in once-through non-proliferative fuel cycles.

U.S. National Security Analysis

The storage of foreign spent fuel in Russia does not pose a national security risk to the United States in terms of a Russian capability to produce new nuclear weapons from the plutonium contained therein. Russia produced an estimated 170 t of WGPu in its plutonium production reactors, or about twice the amount produced by the United States. Thus, having declared 50 t of WGPu as excess—the U.S. declared 52.5 t of Pu excess of which 38.2 t is WGPu —Russia plans to retain about 120 t of WGPu, contained in and available for weapons, while the United States plans to retain only 47 t of WGPu, or less than one-half of what Russia plans to retain. Thus, hypothetically, the first 50 t, or so, of additional plutonium that Russia might seek for new weapons would come from existing stocks of WGPu. Russia has an additional 30 t of separated RGPu stored at Chelyabinsk-65. Not only is it already separated, but the isotopic concentration of Pu-240 of this material on average is probably some-what less than that of the plutonium in the foreign spent fuel. Therefore, the 30 t of separated plutonium in storage at Chelyabinsk-65 is far more attractive a potential source of plutonium for weapons than the plutonium in the foreign spent fuel. Next, Russia has about 7500 t of unprocessed spent fuel discharged from Chernobyl-type RBMK reactors that contains about 35 t of plutonium, and more than 1200 t of unprocessed VVER-1000 spent fuel in wet-storage at Krasnoyarsk-26. Finally, if Russia sought to process the foreign reactor spent fuel for military purposes, the United States could process some of its 38,600 t of commercial spent fuel which contains about 380 t of RGPu.

Economic Analysis

WGPu (6% Pu-240) contains about 94% fissile plutonium (fPu). Commercial power reactor spent fuel contains about 0.9 to 1.0 percent plutonium, which in turn is about 75% fissile plutonium. Therefore, 50 t of WGPu has about the same fPu content as 6000 t of spent fuel. The fees generated by storing 6000 t of spent fuel would be expected to generate on the order of $800-1600 per kilogram of heavy metal (kgHM), i.e., $0.8-1.6 million per tonne of spent fuel stored, or some $5-10 billion for the storage of 6000 t of spent fuel. Only 20 to 30 percent of these revenues would be required to transport, store and maintain the spent fuel in Russia. The remaining revenues would be available for excess plutonium disposition and defense conversion activities.