

Proposal
for the
Disposition of Plutonium and HEU from Weapons¹

Thomas B. Cochran and Christopher E. Paine

Revised
August 26, 1992

The issue of what to do with the plutonium from retired nuclear weapons is unresolved and somewhat contentious. Because of the widely divergent views it will not be possible to find a solution acceptable to all parties. Some compromises will be necessary. This memo outlines preliminary thoughts on one possible solution.

OBJECTIVES:

The main objectives of this proposal are: to phase out the commercial use of nuclear weapons usable material; and to reduce projected world inventories of separated plutonium. This is accomplished by using some of the fissile material from weapons to buy out existing reprocessing contracts, thus, providing an economic incentive to close down existing commercial reprocessing plants. More specifically, we propose:

1. Converting plutonium removed from weapons into mixed-oxide (MOX) fuel for use in commercial nuclear reactors with subsequent geologic disposal of the spent fuel without recycle;
2. Diluting HEU into low enriched uranium for use as commercial reactor fuel with subsequent geologic disposal of the spent fuel without recycle;
3. Phasing out civil and military operations involved in the closed nuclear fuel cycle;
4. Permitting existing commercial fuel processors to profit from their outstanding contracts without reprocessing additional material;

¹ This is a revision of an April 27, 1992 memorandum by Thomas B. Cochran and Christopher E. Paine, where this proposal was originally set forth.

5. To maintain price stability in the uranium market;
and
6. Establish purchasing authority and market valuation
mechanism for plutonium removed from weapons.

PROCESS:

International Nuclear Fuel Bank (INFB): In order to meet the objectives above, an International Nuclear Fuel Bank (INFB) would be established and operated jointly by the United States, Russia, European Community, and Japan. INFB would take custody (although not necessarily physical custody) of weapons usable material, i.e., plutonium and highly enriched uranium (HEU), from retired nuclear weapons and all separated commercial stocks. The material would be stored in weapons states under IAEA safeguards. The fissile materials deposited with the bank will be kept in separate accounts, and the supplier will retain a financial interest in the material it deposits.

End reprocessing: All depositors and customers of the bank would be required to cease operation of chemical separation plants, both military and civil. Any depositor of the bank would be entitled to withdraw its fissile material for non-military uses as described in its deposit agreement with the bank. Under guidelines established by the bank, a depositor can sell or otherwise transfer fissile material to a customer.

Buying out existing reprocessing contracts: Any utility, or other entity, with a valid reprocessing contract (for plutonium recovery from commercial spent fuel) affected by the establishment of the bank, would be guaranteed the right to obtain plutonium, or uranium of equivalent fuel value, from deposits in the INFB. The INFB would determine which depositor(s) would supply the material in accordance with procedures agreed to by the INFB.

It is necessary to establish a price for the fissile material supplied and a fair return to the processors whose contracts will be terminated. One approach is to treat each contract independently. Assuming the affected utility obtained the same grade of plutonium from the depositor(s) that it would have received under its contract with the processor, the utility would be required to purchase the plutonium from the depositor(s) at the contract price, less any payments already made to the processor under the contract. The depositor(s) would be required to pay the processor, out of the payment received from the utility, a fair return on the terminated contract, adjusted to reflect the utility's prepayments to the processor. The INFB would be the final arbiter of what constitutes a fair return.

This approach has the drawback of establishing more than one price for the plutonium. In cases where there have been no prepayments by the utility to the processor, the depositor(s) would receive an amount for the plutonium equal to the cost of processing, and the processor would receive a fee based on its prospective earnings from the contract. At the other extreme, in cases where the entire cost of processing had already been prepaid by the utility, there would be no transfer of funds among the parties to pay the separation cost of the plutonium. The depositor(s), however, would avoid future storage cost for the weapons plutonium, whose economic value is marginal or negative in any case. In all cases conversion to MOX fuel, and fuel element fabrication and transportation costs, would be paid for separately.

A more sensible approach may be to analyze all outstanding contracts and negotiate a fixed price for the plutonium and a single payment to each processor.

In any case, if the grade of plutonium provided by the depositor(s) were different than that called for under the contract, or if uranium were provided in lieu of plutonium, an adjustment would be made to reflect the difference in the fissile content.

Discouraging MOX use in non-weapons states: Utilities in non-weapon states with outstanding processing contracts would be encouraged, but not obligated, to accept low enriched uranium, rather than plutonium, from the INFB. If uranium were provided in lieu of plutonium, the utility would pay the depositor(s), or the INFB, an additional amount equal to the sum of the difference in the costs of fabricating and transporting low-enriched uranium rather than plutonium fuel. This sum would be used to pay the additional costs of fabricating and transporting an equivalent amount of plutonium MOX fuel for use in weapons states.

For example, U.S. weapons HEU "deposited" with the bank could be diluted to LEU and supplied to Japanese utilities in lieu of plutonium scheduled for separation under existing British and French contracts. The reduction in Japanese utility costs from substituting the LEU fuel could be passed on to a utility in a weapon state with a MOX recycle program, such as France, that agreed to purchase fuel made with former warhead plutonium deposited with the bank.

ELIGIBILITY FOR PLUTONIUM/HEU WITHDRAWALS FROM THE INFB:

A utility or other organization holding an existing contract for spent fuel processing.

An existing research program requiring weapons usable material, e.g. plutonium fueled breeder reactors and, for a period of up to ten years, certain research and test reactors now using HEU that cannot be converted to a reduced enrichment (LEU) fuel.

Utilities operating with MOX fuel on a once through basis for the purpose of moving weapon-grade plutonium into spent fuel.

COUNTRY-BY-COUNTRY ANALYSIS:

Russia:

RT-1, the commercial chemical separation plant at Chelyabinsk-65, and the military chemical separation plants at Tomsk-7 and Krasnoyarsk-26 would be shut down. The existing 30 metric tons (MT) of reactor-grade plutonium separated from VVER and naval reactors at Chelyabinsk-65 would remain at Chelyabinsk-65, but under INFB auspices and IAEA safeguards. HEU and weapon-grade plutonium removed from retired weapons would be placed under INFB auspices and IAEA safeguards.

France:

UP1 and UP3 chemical separation plants at Marcoule and La Hague, respectively, would be shut down, and the new UP2 800 plant at La Hague would not be opened next year. Separated plutonium at Marcoule and La Hague would be placed under INFB auspice and IAEA safeguards. Fuel requirements for Phenix and Superphenix (should it be restarted) would be met by the INFB. Cadarache, Pierrelatte (FBFC), and Melox nuclear fuel fabrication are capable of MOX fuel fabrication. Civil PWR could burn MOX on a once through basis.

Japan:

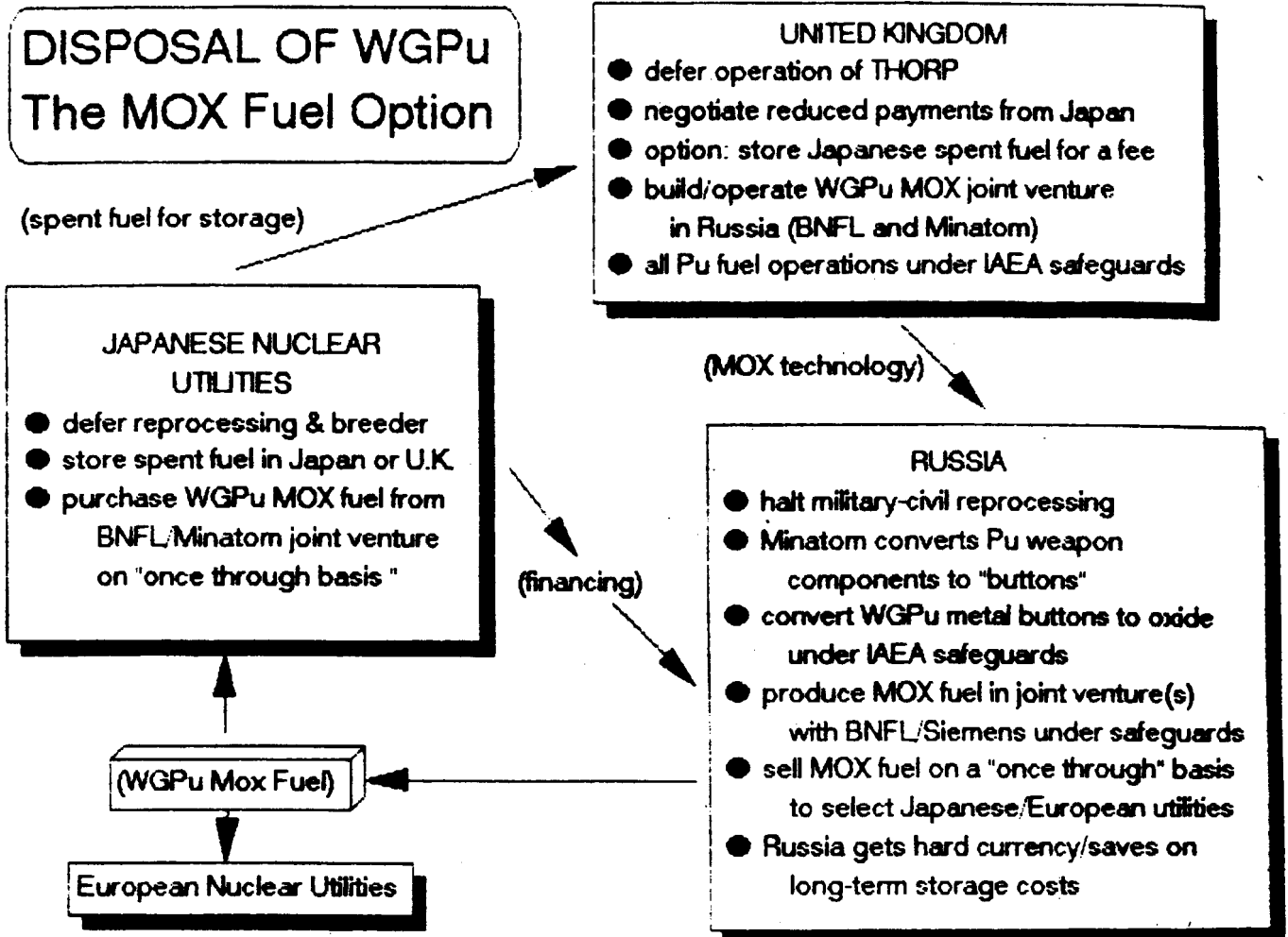
Monju fuel would be obtained from INFB. Separated plutonium at La Hague would remain stored at La Hague under INFB auspices. Operations at the Tokai-mura reprocessing plant would be terminated. The Rokkasho-mura plant would not be built. Japanese utilities with processing contracts would be encouraged to accept LEU in lieu of MOX.

United Kingdom:

The B205 chemical separation plant at Sellafield would be shut down. The new THORP reprocessing plant at Sellafield would not be started.

United States:

The F- and H-area chemical separation plants at the Savannah River Site would not be restarted. The PUREX plant at Hanford and the ICPP plant at INEL - both currently shut down - would be closed permanently.



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