

# **Reprocessing: Why we can and should wait**

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Forum on the Nuclear Fuel Cycle

Russell Senate Office Building Room 385

Nov. 16, 2005

## Where Finck and I agree

*"Reprocessing...is insufficient to yield any significant benefits by itself: Benefits are only incurred once the reprocessed materials are recycled and partially or totally eliminated."*

*"[Recycling plutonium once in current-generation reactors, as is done in France] results in... the increase in the net cost of electricity [by] a few percent...does not significantly improve the utilization of the repository space [and] does not significantly improve the utilization of natural uranium"*

-- Phillip Finck, answers for the record, hearing on Nuclear Fuel Reprocessing, Energy Subcommittee of the House Science Committee, June 16, 2005 (as published in *Nuclear News*, Sept. 2005, p. 10).

## What is being proposed in addition to reprocessing?

For every three current-generation reactors the construction of one sodium-cooled fast-neutron burner reactor to fission the plutonium and other transuranic elements they produce.

*“The excess cost for a separations and transmutation (S&T) disposal system over once-through disposal for the 62,000 [metric tons] of LWR spent fuel is uncertain but is likely to be no less than \$50 billion and easily could be over \$100 billion if adopted in the United States.”*

[*\$1-2 billion per reactor more than building the equivalent capacity of current-generation reactors operating on a once-through fuel cycle, Nuclear Wastes: Technologies for separations and transmutation* (National Academy Press, 1996), p. 79.]

# Why we can wait

## 1. **We don't have any fast-neutron reactors.**

Congress cancelled the U.S. demonstration in 1983 after the expenditure of many billions of dollars on R&D. France, Germany and the U.K. all built and abandoned fast-neutron demonstration reactors because of prohibitive costs.

## 2. **If we did, there is plenty of already-separated plutonium**

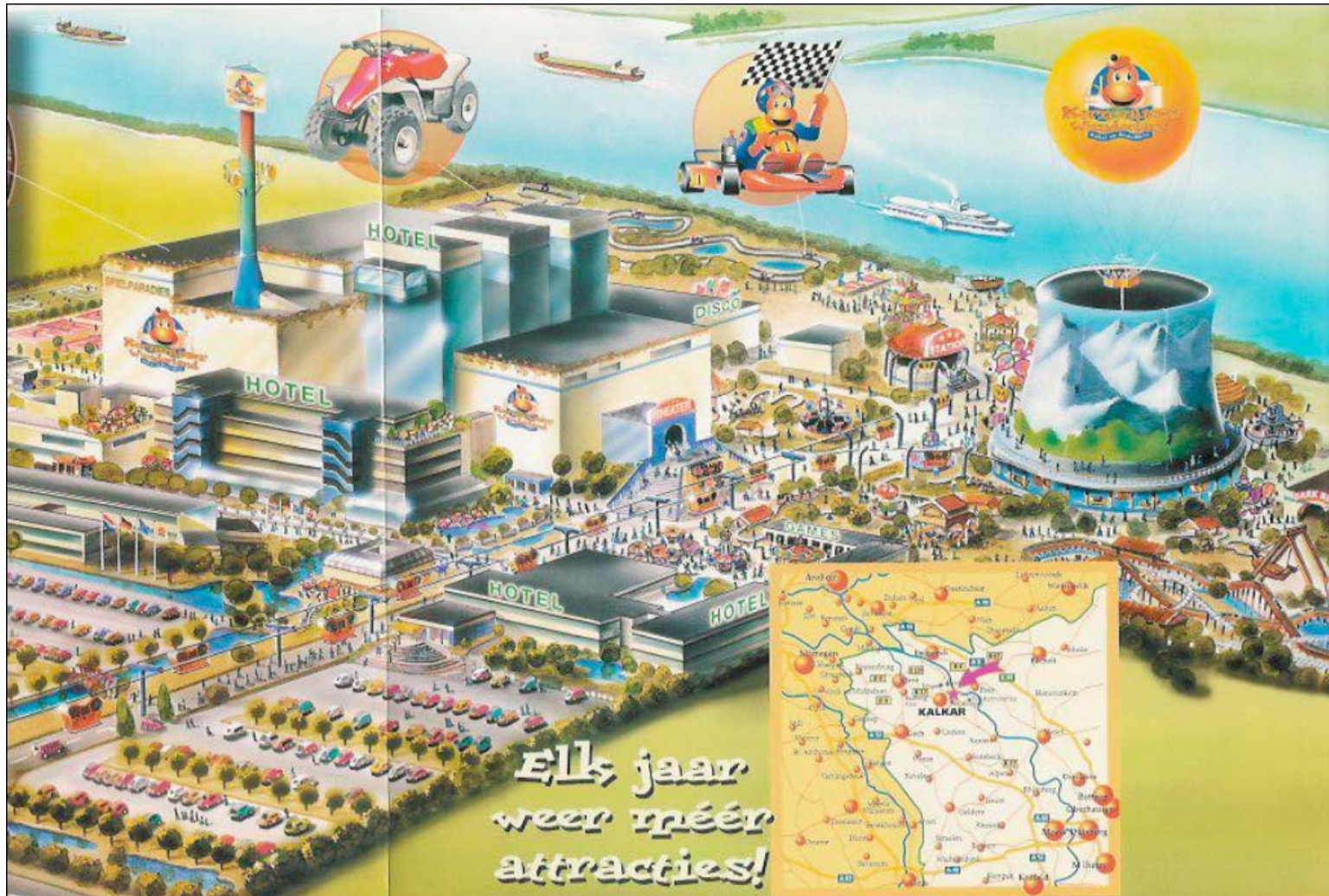
Excess U.S. weapons plutonium plus 250 tons of separated civilian plutonium worldwide -- enough to fuel 16 fast-neutron breeder reactors for 20 years

*Legacy of 1960s-70s promotion of fast-neutron reactors.*

## 3. **Storage of spent fuel in dry casks is safe for 50-100 years**

At one tenth the NAS estimated cost for the fast-reactor alternative.

To see what spending \$8 billion on a demonstration fast-neutron reactor can buy, go to Kalkar Germany



## Why we should wait: proliferation

U.S. stopped promoting reprocessing after India's 1974 "peaceful nuclear explosion," made with the first plutonium separated with U.S. technical support.

*"[W]e're not sure that it's possible to use this chemical technology to separate the plutonium in combination with a few other things, in a fashion that will make it both proliferation resistant and economically viable."*

--William Magwood, Director, DoE Advanced Fuel Cycle Initiative, before the House Energy and Water Appropriations Subcommittee, March 15, 2005.

How could we tell other countries not to reprocess?

U.S. has been extraordinarily successful for 30 years in opposing the spread of reprocessing to non-weapon states by making the argument:

*“We don’t reprocess. You don’t need to either.”*

# Summary

For the next few decades we have two choices for the transuranics in U.S. spent fuel:

- 1) Store it in the spent fuel where it will be protected by a lethal fission-product gamma field while we try to deal with the problem of already separated plutonium (cost: \$100-200 per kilogram of spent fuel).
- 2) Store it separately and hope that the U.S. Government will eventually build the infrastructure required to fission it (cost: \$1000-2000 per kilogram of spent fuel) -- and watch states interested in acquiring a nuclear-weapon option follow our example.

## For more information

*Nuclear Wastes: Technologies for Separations and Transmutation*, National Academy Press, 1996.

“Is U.S. reprocessing worth the risk?” by Steve Fetter and Frank von Hippel, *Arms Control Today*, September 2005.

“Limited proliferation resistance benefits from recycling unseparated transuranics and lanthanides from light-water reactor spent fuel” by Jungmin Kang and Frank von Hippel, *Science and Global Security*, in press (for a copy contact [fvhippel@princeton.edu](mailto:fvhippel@princeton.edu)).