

Institutional Framework and its Use for Spent Nuclear Fuel



Notre Dame Construction: 1163-1250
Maintenance: 1250-present

Clifford Singer: Aug. 19, 2010
University of Illinois, Departments of
Nuclear Engineering and Political Science



Dry Cask



Storage
Overpack



Transport
Overpack



Institutional Framework

- **Cooperation of Communities:**
Build trust; keep to commitments
- **Cooperation of States:**
Value good sites like an oil resource.
States will want to gain tenths of the total project costs, not just a few % !!

An institutional framework to address host state concerns is needed.

'Plan D' Institutional Framework

(See <http://acdis.illinois.edu/publications/RR.html> for Plan D consensus report.)

- Payments into a **Permanent Fund** whenever products from nuclear reactor discharge are moved into a host state. (Either intact dry casks or reprocessed materials.)
- Establishment of an **Escrow Fund** as each dry storage cask is filled, for all spent fuel from newly licensed reactors—and for as many other casks as possible.

Feds require different minimum Permanent Fund balances for repositories, interim storage, or reprocessing facilities.

States can require larger balances and reap interest earnings as long as minimum required balances are kept.



Escrow Funds

- Payments into dry cask **Escrow Funds** instead of the Nuclear Waste Fund can be required for newly licensed reactors.
- To avoid further lawsuits, DOE can try to negotiate setting up **Escrow Fund** balances for old spent fuel, and for new spent fuel from already licensed reactors.

Escrow Fund balances would be used to manage spent fuel in dry casks as long as the casks stay in their state of origin. Balances not required for **Permanent Fund** payments when casks are shipped out of state would be kept by utilities or rate payers, per state regulatory decisions.



Financial Incentives

The recommended approach to fund balances incentivizes:

- States to take in spent fuel from other states.
- Utilities to ship spent fuel out of state when and only when it is economically optimal to do so.

Much spent fuel might then long remain at operating reactor sites or at away from reactor aging facilities. However, prompt geological repository siting would still be essential for building confidence that a host state will take spent fuel when utilities want to ship it.

MAKING BEST USE OF GOOD INSTITUTIONAL ARRANGEMENTS



Monopoly situation where only one repository site is licensed should be avoided in a voluntary process because it would:

- Generate federal/state tension over state compensation.
- Generate tension in the host state over whether compensation is equitable.
- Allow the single host state to require much higher compensation levels as the price for cooperation.
- Risk collapse of the process either due to anticipation of these tensions arising or failure to agree on final licensing arrangements.

● Reactors & ★ Stranded Fuel Sites



Operating Reactors:

8 in West; 31 Midwest+Arkansas; 65 South+East

Different Methods May Be Suitable for Different Regions



Western States:

Largest DOE wastes needing prompt attention

Oregon and N. California stranded fuel & no reactors

Some near-term burial in salt or retrievable mode is OK

Midwest States:

Little defense spent fuel

No states with stranded fuel only

Few operating reactors in densely populated counties

Hold spent fuel at operating reactors pending final decision

East and Gulf Coast States:

Some DOE wastes and commercial fuel needs moving out of state

Some consolidation pending decision on reprocessing vs. burial.



Economics of Multiple Site Licensing

Why multiple site licensing can be economically advantageous:

- There is now extensive U.S.+ Scandinavian operating or design experience with salt, retrievable oxidizing environment, and copper casing in a non-oxidizing zone.
- With a cooperative process, lower payments to competing states should more than compensate for extra licensing costs.
- Without a cooperative process, states' opposition is likely to lead to extensive delays and risk overall failure.



Conclusion: Do This (or Better)

The BRC should recommended a process that has about 6 finalist states competing for granting 2 or preferably 3 repository site licenses.

At least an equal number of spent fuel aging facilities should be similarly be licensed, some at repository sites.

In this context reprocessing will not be economically favorable for many decades, if ever. If a pilot scale reprocessing facility is nevertheless licensed, it should also be licensed as an indefinitely renewable aging facility (based on previous experience).