

Spent Nuclear Fuel Management Policy Changes

Clifford Singer

Departments of Nuclear, Plasma, and Radiological Engineering and of Political Science
University of Illinois at Urbana-Champaign
Summary of presentation on April 24, 2006

The U.S. Secretary of Energy has recommended a Global Nuclear Energy Partnership (GNEP) as a “comprehensive strategy to enable the safe and secure expansion of nuclear energy around the world.” To this end, GNEP could encourage the provision of fresh nuclear fuel and take-back of spent nuclear fuel from emerging nuclear energy programs. This could be particularly important for countries that do not currently enrich uranium for fresh nuclear fuel or separate plutonium from spent nuclear reactor fuel. If successful, GNEP could increase international security by limiting the spread of materials and technology useful for production of nuclear weapons. By eliminating the need for emerging nuclear power programs to duplicate expensive uranium enrichment and spent fuel management already available elsewhere, GNEP could also make international cooperation with this goal more attractive.

To make a useful contribution to managing the spent nuclear fuel of emerging nuclear power programs in other countries, the United States will first need to develop and implement a domestic consensus on how to handle its own much larger volumes of spent fuel. It is not yet clear what will be the relative contributions of four different options for managing spent U.S. nuclear fuel over for the rest of this century:

- (a) Storage in dry casks on or near the surface.
- (b) Direct placement in deep underground storage to be sealed after a few centuries.
- (c) Reprocessing to make mixed plutonium-uranium oxide fuel for existing reactors.
- (d) Reprocessing to burn plutonium, probably in reactors cooled with liquid metal.

There are, however, six changes to current U.S. nuclear waste management policy that are largely independent of how far reprocessing is pursued, and of where the underground repository will be that eventually holds most long-lived U.S. radioactive waste. It may thus be possible to develop a consensus around one or more of these even as discussion continues on more technically difficult or politically contentious issues.

#1 Aging Pads

Instead of putting spent fuel deep underground straightaway at a repository, store it in dry casks on or near the surface for at least 100 years.

#2 Protect More Land

Set aside more federal land around a repository for restricted development and further study, at least until it is decided just what will be placed deep underground.

#3 Plan Ahead for On-site Storage

Require all new nuclear reactor construction to plan for on-site dry cask spent fuel storage until reactor decommissioning.

#4 Avoid Litigation on Existing on-site Storage

Until away-from-reactor spent fuel storage becomes available, negotiate waste management payments for interim spent fuel storage installations (ISFSI's) needed at reactor sites (instead of having fines levied by courts against the government).

#5 Plan Ahead for Away from Reactor Storage

Require any prospective reprocessing facility to have storage for and take the spent fuel that has nowhere else to go or stay. Require that this occur even if reprocessing does not proceed as expected.

#6 Allow Importing States a Permanent Fund

Allow states that take spent fuel to build an insurance fund with a spent fuel acceptance fee.

- The principle would be used to insure against transport accidents and mismanagement.
- The interest on the fund could be available to the state's residents—like the Alaska Permanent (Oil) Fund.

Allowing states taking spent nuclear fuel to build up a Permanent Fund from an acceptance fee is unlikely to overcome all resistance to siting of a spent fuel management facility. However, it would help restore a sense of equity to the siting process, and it could greatly improve the attractiveness of continuing to accept spent nuclear fuel once a facility was up and running. In particular, it can be important that a state slated for a spent fuel reprocessing facility be required to accommodate dry cask spent fuel storage—and be compensated for doing so if the plutonium reprocessing and fuel fabrication and turn out not to be fully implemented.

Allowing fees for taking spent fuel should replace government-directed decision-making on the fate of spent nuclear fuel by a more efficient market mechanism for allocating spent fuel between:

- A) Nuclear reactor sites
- B) Away from reactor storage (e.g. at a site that may eventually be used for reprocessing)
- C) Additional away from reactor storage (e.g. at a site that may eventually be used for expanded underground storage)