Recommendation No. 81

March 23, 1999

High Level Waste Salt Disposition Alternatives To The In Tank Precipitation Process Supplemental Environmental Impact Statement

Background:

There are two basic wastes in the Savannah River Site (SRS) High-Level Waste (HLW) tank farm. They are HLW sludge and HLW salts. In the HLW tank farm there are 2.8 million gallons of sludge, which comes from settling of metals and radionuclides in HLW and contains about 320 million curies. There are also approximately 31.2 million gallons of HLW salts consisting of 15.2 millions gallons of saltcake derived from evaporating water from the HLW and 16.0 million gallons of a salt solution known as supernate; together these latter two fractions contain another 160 million curies in the HLW tank farm. The HLW sludge is being incorporated into molten glass and poured into stainless steel canisters in the Defense Waste Processing Facility (DWPF). The HLW salt was to be processed in the In-Tank Precipitation (ITP) facility to produce two types of waste: a high-activity, small-volume waste stream to be mixed and vitrified with the sludge in the DWPF, and a low-activity, large-volume waste stream for stabilization and disposal in grout at the SRS Saltstone Facility.

The ITP commenced operation in 1995 but was shut down in 1996 because a much larger volume of flammable benzene was produced than expected. A research program was started to solve the problem. However, in January 1998, SRS decided that the current ITP process could not cost-effectively meet safety and production requirements. A systematic search for alternatives was initiated in which one-hundred-and-thirty possible alternatives were identified. This large number of alternatives was reduced to eighteen and then to four after increasingly detailed analyses.

The evaluation process was reviewed by a public review group of citizens and by the Citizens Advisory Board (CAB; see CAB Recommendation 69, Ref. 1).

Because the selection of HLW Salt Disposition Alternative is considered a significant change to the DWPF Environmental Impact Statement (EIS), the Department of Energy (DOE) has decided to prepare a Supplemental EIS (SEIS). Scoping meetings for the SEIS are being conducted this month. The purpose of this motion is to provide input to the SEIS scope.

One of the four alternatives identified in the final alternative selection phase has been eliminated for technical reasons (i.e., the caustic-side solvent extraction alternative was eliminated). Three viable alternatives remain to be evaluated in the SEIS. They are: (1) Small Tank Precipitation, (2) Non-Elutable Ion Exchange and (3) Cesium Encapsulation in Grout. A new fourth alternative, (4) the No-Action Option required by the National Environmental Policy Act (NEPA) for EIS's, was included. The first two alternatives involve chemical processes to remove the radioactive cesium (the major radionuclide in the salt) and mix it with the sludge for processing in the DWPF. The remaining low-activity salt will go to the Saltstone Facility for disposal at SRS. Technical issues remain to be resolved with both of the first two alternatives. However, the third alternative puts all of the radioactive cesium into the Saltstone for ultimate disposal at SRS. While this alternative is technically easier than the other alternatives, it leaves a major part of the waste disposed in vaults in the ground at SRS (120 million curies), raising regulatory and political issues. The No-Action Option creates extreme danger to the public and the environment by increasing the potential for explosive hydrogen gas buildup and tank failures, making it an unrealistic option to consider abandoning HLW in the SRS HLW tank farm.

Recommendation:

The SRS Citizens Advisory Board (CAB) wants SRS to solve the salt disposition issue expeditiously. We are particularly concerned about consideration of the Cesium Encapsulation in Grout alternative and will not favor it unless it is fully justified. We will not accept it as the preferred alternative for the sole reason that funds are not available for the other choices. To be acceptable to the CAB, the preferred alternative must be justified for reasons of technical feasibility, worker safety, and public health and environmental protection. In addition, we recommend that the SEIS:

1. Consider the life cycle costs for all options including institutional care for all four options.

2. Evaluate the probability of intruders gaining access to the Saltstone Facility and the HLW tanks for up to 300 and up to 10,000 years for all options (i.e. this covers ten half lives for Cesium-137, and a repository-like period for tank failures and releases).

3. Compare the total curie content and concentrations for all known radioactive low-level burial grounds country-wide with the curie content in the Saltstone at SRS for all three alternatives ((i.e., 26,000 curies in saltstone for alternatives (1) and (2), and 120,000,000 curies for alternative (3)).

4. Evaluate the impact of the radioactive Cesium Encapsulation in Grout alternative on the proliferation resistance of the HLW canisters. Proliferation resistance to terrorists who might be tempted to recover the plutonium from the vitrified canisters to build nuclear weapons depends upon the high radiation fields from the presence of Cesium-137 in the HLW; removing the Cesium-137 from the vitrification process and disposing of it in grout in the ground at SRS means that the radioactive cesium will not be available to enhance the proliferation resistance of the plutonium in canisters of vitrified HLW.

References

1. SRS CAB Recommendation 69, Selection of HLW Salt Disposition Alternatives, adopted November 17, 1998.

Agency Responses

Department of Energy-SR