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DEPARTMENT OF ENERGY

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Defense Waste Processing Facility Savannah River Plant Aiken, S.C.; Record of Decision

TEXT: This Record of Decision has been prepared pursuant to regulations of the Council on Environmental Quality (40 CFR Part 1505) and Implementing Procedures of the Department of Energy *(45 FR 20694).*

Decision

The Department of Energy (DOE) has decided to construct and operate a Defense Waste Processing Facility (DWPF) at the Savannah River Plant (SRP) to immobilize existing and future high-level radioactive wastes (HLW) generated and stored at SRP. The DWPF will be built at Site S in stages; construction of the sludge processing facility will begin first, followed by facilities to treat the salt cake and supernatant liquid. The strategy for disposal of the immobilized HLW is to dispose of it of site in a Federal geologic repository. Decontaminated salt will be disposed of on site. The selection of the waste form for the DWPF, and the siting and design of the repository will be addressed in subsequent environmental analyses.

Background

The SRP near Aiken, South Carolina, is a major installation of the DOE for the production of nuclear materials for national defense. It began operations in the early 1950's and is the nation's primary source of reactor-produced defense materials. These operations also generate HLW from the chemical processing of fuel and target materials after their irradiation in the SRP nuclear reactors. The HLW is stored in underground tanks at SRP. It is composed of sludge, crystallized salt cake, and a supernatant aqueous solution.

The long-term management strategies for the SRP HLW were evaluated in the "Environmental Impact Statement -- Long Term Management of Defense High-Level Radioactive Waste (Research and Development Program for Immobilization), Savannah River Plant, Aiken, South Carolina" (DOE/EIS-0023), November 1979. As a result, DOE decided to continue the research and devel-

opment program directed toward immobilization of the SRP HLW, and not to undertake an R&D program on direct disposal of waste in bedrock under SRP (Record of Decision, February 13, 1980).

The Department of Energy published the "Environmental Impact Statement -- Defense Waste Processing Facility, Savannah River Plant, Aiken, South Carolina" (DOE/EIS-0082), in February 1982. The proposed action in the EIS was: (1) To select a disposal strategy for existing and future SRP high-level radioactive waste, and (2) to decide on the construction and operation of a DWPF to immobilize the HLW in a form suitable for shipment to and disposal in a Federal repository. Reasonable alternatives for the proposed action were also analyzed. Notice of the availability of the EIS was published in the Federal Register by the Environmental Protection Agency on March 12, 1982 *(47 FR 10901).*

The analysis of alternative strategies for the disposal of the immobilized HLW relies on analyses and decisions resulting from the "Environmental Impact Statement -- Management of Commercially Generated Waste," DOE/EIS-0046F, October 1980. Based on this EIS, DOE decided to: (1) Adopt a strategy to develop mined geologic repositories for disposal of commercially generated HLW and transuranic wastes, while continuing to examine subseabed and very deep hole disposal as potential backup technologies, and (2) conduct a research and development program to develop repositories and the necessary technology to ensure the safe, long-term containment and isolation of the wasted.

Descripition of Alternatives

The preferred disposal strategy identified in the EIS is disposition of the immobilized HLW in a Federal geologic repository. The following alternative strategies were considered:

1. Indefinite tank storage at SRP (no action).

2. Other

a. Subseabed disposal.

b. Very deep hole disposal.

c. Rock melting.

d. Island disposal.

e. Ice sheet disposal.

f. Deep well disposal.

g. Partitioning and transmutation.

h. Space disposal.

Disposal in a Federal geologic repository will require that the SRP HLW be processed into a form meeting applicable repository criteria. The following immobilization alternatives were considered:

1. *Reference Immobilization Alternative:* Construction and operation of a large Defense Waste Processing Facility for the integrated processing of sludge, salt cake, and supernatant to form: (1) Borosilicate glass for disposal in a Federal repository, and (2) decontaminated salt for disposal at SRP. The immobilized HLW would be stored temporarily at SRP until a Federal repository be-

comes available. Borosilicate glass is presented in the EIS as the reference waste form for immobilizing the SRP HLW. Alternative waste forms are being evaluated. The selection of the waste form for the DWPF will be addressed in a subsequent environmental review.

2. *Delayed Alternative:* This action delays construction and operation of a DWPF under the reference immobilization alternative for ten (10) years. It assumes that by then a Federal repository would be available to receive the immobilized waste so that no more then ninety (90) days of interim storage may be required, and that a decision on a waste form would have been made for the DWPF.

3. *Staged Process Alternative (Preferred Alternative):* This alternative was developed from the reference immobilization alternative and would incorporate a phased or modular construction program along with improvements resulting from ongoing R&D. First, a facility would be constructed to treat the sludge, and then a facility would be constructed to treat the salt cake and supernatant. In this alternative, construction costs would be spread more evenly over the years of construction.

Alternative sites, all located near the middle of the SRP site, were considered for the DWPF. The construction site, Site S, was chosen primarily because of its proximity to the HLW storage tanks and to a suitable salt disposal area, as well as its suitability for construction. Although site S was not clearly the environmentally preferred site, differences in potential environmental impact were not or sufficient magnitude to affect the selection of Site S based on the above considerations.

Disposal alternatives considered for the decontaminated salt include: Land disposal, returning it to the waste tanks, and packaging it for shipment to a geologic repository. Land disposal in a form commensurate with its chemical and radioactive properties is the preferred disposal method. Four sites at SRP were considered for disposal of the decontaminated salt. The primary advantages of Site Z are its proximity to the DWPF and the depth of groundwater. These considerations make Site Z the environmentally preferable alternative.

Basis for Decision

High-level defense waste must be managed so that current and future generations will be protected from potential hazards. The principal objective for disposal is to isolate the waste from the human environment with minimum reliance on maintenance and surveillance. Continued tank storage at SRP would require periodic construction of, and transfer of, the wastes to replacement tanks and is an interim measure.

The strategy of geologic disposal of the immobilized SRP HLW was adopted based on numerous analyses and on the decision for disposal of commercially generated HLW. As discussed in both DOE/EIS-0046F and DOE/EIS-0082, systems that can adequately dispose of commercial radioactive wastes can reasonably be expected to adequately dispose of defense wastes because they produce lower temperature and lower radiation levels than do comparable commercial high-level wastes.

The construction and operation of the DWPF in stages is consistent with DOE policies and earlier documents (ERDA 77-42, ERDA-1537, and DOE/EIS-0023) for SRP waste management and operations. Although the reference immobilization alternative is technically viable, the staged process alternative achieves the same objectives with comparable safety and environmental impact at lower initial capital cost. Ongoing research and development efforts will further refine design, con-

struction, the operational aspects of the DWPF. The process for the actual DWPF, as build, may therefore differ from the present descriptions due to the incorporation of such refinements.

None of the immobilization and disposal alternatives is so clearly environmentally superior that it can be identified as environmentally preferable. As stated in the Record of Descision for DOE/EIS-0046F, the long-term effects of mined geologic disposal and those of the backup disposal strategies (subseabed and very deep hole concepts) would be very similar, and the radiation doses to the public are only a small fraction of the naturally occurring doses. The immobilization alternatives are similar environmentally. In general, the staged process appears to be environmentally, slightly preferable.

Considerations in the Implementation of the Decision

The DWPF will be designed and built to comply with DOE standards including earthquake, tornado, fire, radiation protection, and environmental protection. The construction of the DWPF will not pose any significant or unmitigable impacts. Measures to minimize potential environmental impacts include sound engineering design, proper construction practices (e.g., erosion and storm run/off control to minimize aquatic impacts), and an effective quality assurance program. Impacts on a one hectare wetland, one of about 200 Carolina Bays on the SRP site, however, cannot be avoided. No practicable alternatives of locating the DWPF at Site S exist that would avoid eliminating the wetland. DWPF construction at alternative sites would impact similar wetlands. The final site layout and design of the DWPF will include all practicable methods of mitigating the impact. For example, permanent retention of storm run-off sedimentation basins after DWPF construction will result in manmade wet areas similar in most respects to the natural wetland. The ongoing comprehensive environmental monitoring programs will be expanded to detect any unanticipated impact of DWPF construction and operation.

For the United States Department of Energy.

Dated: May 24, 1982.

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