

memorandum

0047067



DATE: APR 05 1996

REPLY TO
ATTN OF: RW-30SUBJECT: Evaluation of Hanford Longer High-Level Waste Product Canister Option for
Acceptance by the Civilian Radioactive Waste Management SystemTO: Jackson Kinzer, Assistant Manager
Office of Tank Waste Remediation System

This is in response to your February 2, 1996 memorandum to Samuel Rousso, Office of Waste Acceptance, Storage and Transportation, requesting an evaluation of a proposed 4.5 meter-long canister for HLW borosilicate glass. We apologize for not being able to respond to your request by the due date of March 1, 1996. Because of funding constraints imposed by the FY 1996 appropriations, the Program currently has very limited resources for conducting unscheduled work:

In your memorandum you requested our evaluation of the technical acceptability of a longer canistered waste form and, if acceptable, the waste acceptance specifications that would be impacted by its adoption. From our evaluation, we have found that a longer canister, not to exceed 4.5 meters (15 feet), for vitrified HLW that has characteristics similar to the Savannah River Site Defense Waste Processing Facility product would be technically acceptable. The scope of our evaluation and the assumptions used in the evaluation are shown in the following Attachment.

Please feel free to contact Steven Gomberg on my staff, should you have any questions regarding this evaluation. Steve can be reached at (202) 586-6497.

Ronald A. Milner, Director
Office of Program Management
and Integration
Office of Civilian Radioactive
Waste Management

Attachment

cc:

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C. Quan, RW-37

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APR 16 1996

DOE RL/CCC

I 96-TWR-213

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ATTACHMENT – IMPACTS OF THE HANFORD 4.5-METER HLW WASTE CANISTER ON THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM

A. Scope of Evaluation

The following areas were evaluated:

- Mined Geologic Disposal System Surface Facilities
- MGDS Subsurface Facilities
- MGDS Waste Package
- Transportation Cask

It was found that the longer canister could be handled in the current repository design without significant impact. Generally, the MGDS facilities/equipment would not be impacted by the canister length since commercial SNF is almost 15 ft. long.

The longer Hanford canister was evaluated with a preliminary 5-canister HLW Waste Package design, which has a larger diameter than the baseline 4-canister HLW Waste Package. There was potential that the larger diameter waste package, along with the extra length from the 15 ft. HLW canister, could impact the Subsurface Facilities, particularly tunnel diameter. However, it was found that the larger package could still be accommodated by the current Subsurface Facilities design. Additionally, the longer canister would not affect the maximum lift height required by the Surface Handling Facilities.

The weight of the preliminary 5-canister HLW Waste Package loaded with the longer HLW canister was determined to be approximately 51 tons. In contrast, a loaded 21 PWR MPC Waste Package weighs approximately 73 tons in its current design. Since the large MPC Waste Package exceeds the weight of the 5-canister HLW canister Waste Package, the MGDS facilities would not therefore be impacted by the longer HLW canisters.

Currently, no transportation cask has been designed for shipping HLW. However, an appropriate rail cask could be designed for shipping the material, with 5 HLW canisters per cask. Rail weight limits would not be exceeded with such a cask.

B. Assumptions Used in the Evaluation

The evaluation assumed that the canister content would comply with the existing baseline requirements on vitrified HLW contained in the OCRWM Waste Acceptance System Requirements Document. These requirements include

- (1) general waste form criteria in 10CFR60.135 (e.g. must be solid, no particulates, no combustibles, no free liquids, no explosive, pyrophoric or chemically reactive materials);
- (2) fill height >80% volume
- (3) heat generation rate <1500 watts/canister
- (4) canister leak rate <1E-4 atm-cc/sec
- (5) canister labelling
- (6) canister handling
- (7) 10CFR60.131 criticality control
- (8) material compatibility
- (9) reporting requirements on chemical composition, canister material, fabrication, radionuclide inventory and activity, amount of canister material (wall thickness removed) during decontamination
- (10) "after canister closure" requirements (no organics, no free gas, internal gas pressure <150 kPa)
- (11) removable contamination requirements (non-fixed surface - alpha <2200 dpm/100 sq cm; beta and gamma <22,000/100 sq cm; no visible product on canister surface)
- (12) RCRA requirements (no RCRA-regulated material, including lead, in first repository)
- (13) Consistency Test requirement (perform PCT against benchmark)
- (14) Radiation Field at shipment (gamma <1E+5 R/hr; neutron <10R/hr)

Not included as requirements but assumption made in order to do the evaluation:

- (1) Isotopic content of the Hanford 15 ft. canister was assumed to be the same as the Savannah River DWPF product. If the Hanford canistered waste form is different, total system performance may be affected. This would need to be reevaluated.

The Standard HLW Canister requirements would need to be modified to add the new dimensions (assumed as length 4.5 meters (15 ft); diameter 61 cm; weight 3750 kg.) Note: weight assumed to be proportional to the weight of the 3.0 meter canister. The following requirements would need further evaluation:

- (1) Waste type. If a waste type is chosen other than borosilicate glass, what is the product transition temperature? This product transition temperature lowered by an appropriate safety factor would have to replace the glass transition temperature for borosilicate glass.

- (2) Canister impact test. The 7 meter drop test height is based on the maximum lift height at the repository for handling the 3-meter canister.
- (3) HLW canister condition at the time of shipment to the repository (change in size and shape due to creep during the filling and subsequent cooling and during interim storage prior to shipment). The canister must be able to pass the "ring" test to ensure it could be loaded into the transportation casks and disposal canisters after a period of time well beyond waste form production. Information would be needed so design work can proceed for the transportation cask, waste package, and MGDS Surface Facilities including lag storage areas.
- (4) Characteristics of the HLW. Any modification in the characteristics of the waste may require an assessment of its impacts on system design and system/site performance.