



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
 WASHINGTON, D.C. 20555

MAY 19 1992

Mr. John P. Roberts, Acting  
 Associate Director for Systems  
 and Compliance  
 Office of Civilian Radioactive Waste  
 Management  
 U.S. Department of Energy, RW-30  
 Washington, D.C. 20585

Dear Mr. Roberts:

**SUBJECT: WASTE ACCEPTANCE PROCESS ISSUES**

This is in response to the U.S. Department of Energy (DOE) letters dated August 21, 1991, November 8, 1991, and December 9, 1991, in which DOE addressed an issue related to the Waste Acceptance Process (WAP) for glass waste forms. Specifically, the letters addressed the "linkage" issue raised by the U.S. Nuclear Regulatory Commission staff regarding the lack of a relationship between the Waste Acceptance Preliminary Specifications (WAPS) and the performance allocated to the glass waste form in DOE's 1988 Yucca Mountain Site Characterization Plan (SCP). This issue was discussed in a March 1, 1991, teleconference between our respective staffs and later at the August 7-8, 1991, orientation and tour of the Defense Waste Processing Facility (DWPF) at Savannah River, as described in the NRC staff trip report (letter dated September 30, 1991, from J. Linehan, NRC, to D. Shelor, DOE).

In its August 21, 1991, letter, DOE indicated that it has conducted an evaluation of the "linkage" issue cited above and concluded that the SCP does not establish a direct relationship between the WAPS (specifically, Specification 1.3 for radionuclide release properties) and the tentative performance allocated to the glass waste form in the SCP. DOE further stated that it is developing a revised WAPS for all vitrified high-level waste (HLW) which will reflect DOE's intent to remove any suggestion of linkage between the WAPS and repository post-closure requirements or performance allocation. As DOE acknowledged in the letter, current versions of the WAPS for the DWPF and the West Valley Demonstration Project (DOE/RW-0260 and 0261) indicate an intended relationship between the specification in the WAPS for radionuclide release properties and performance allocation with an overall purpose to support compliance with the regulatory performance requirements for the engineered barrier system (EBS).

Perhaps the referenced exchange of correspondence has diverted attention from the basic regulatory concerns that relate to the waste glass program. The NRC understanding of DOE's approach to the glass production program is based on the DOE description of the WAP (transmitted by letter dated August 19, 1985, from R. Stein, DOE, to R. Browning, NRC), WAP baseline documents (i.e., draft WAPS), and related meetings and correspondence with DOE. Because of the express

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language of the WAP and related correspondence, the staff expected the WAP to address performance related issues, including the allocation of performance to the various components of the waste package. The draft WAPS and the SCP appeared to satisfy this intent. It is, of course, DOE's prerogative to change the SCP performance allocations and to revise the WAPS, as has been indicated in your August 21, 1991, and subsequent letters. Such modifications may however, introduce further uncertainties into the regulatory process, especially in light of the purpose of the WAP to minimize licensing risks related to the glass waste form. Consequently, it is appropriate to review the pertinent regulatory requirements that relate to waste packages.

As DOE is well aware, the NRC's performance requirements for engineered barriers are described in 10 CFR 60.113(a), which specifies the performance objectives for containment of high-level waste by the waste packages and subsequent controlled release by the EBS following the containment period. 10 CFR 60.135 specifies the design requirements for the waste packages, including the waste form; and criticality control requirements which need to be considered in waste package design are provided in 10 CFR 60.131(b)(7). Lastly, 10 CFR 60.21(c)(1)(ii)(D) requires that DOE provide in its license application an assessment of the effectiveness of engineered and natural barriers against the release of radioactive material to the environment. This assessment must include a comparative evaluation of alternatives to the major design features that are important to waste isolation, especially those alternatives that would provide longer radionuclide containment and isolation.

For waste forms other than spent fuel, the requirements of 10 CFR 60.21(c)(1)(ii)(D) become especially important inasmuch as the waste form (e.g., glass) can be truly designed as an important barrier in the waste package system and DOE has control of the composition of these waste forms. The same cannot be said for the spent fuel waste form because fuel is not designed on the basis of its expected performance in a repository environment and DOE will have to accept and deal with the resulting characteristics of spent fuel in its waste package development program. As such, fuel can be considered as a true "given" in the waste package system whereas glass, for example, should not be treated as a "given." This distinction between spent fuel and waste forms other than spent fuel is important because DOE should consider the requirements of 10 CFR 60.21(c)(1)(ii)(D) in the selection and design of waste forms for wastes other than spent fuel. These requirements apply even if DOE assigns no performance allocation to the waste form component of the waste package system. This means that, in the license application, DOE will need to provide an assessment which explains and supports the selection of borosilicate glass as the waste form of choice for the high-level wastes at West Valley, Savannah River, and Hanford. Further, within the families or classes of different borosilicate glasses, DOE will be expected to provide an assessment which explains and supports the selection of the borosilicate glass formulation of choice for the various high-level wastes, with particular attention given to features (e.g., leach resistant glass that is minimally fractured) that would provide greater radionuclide containment and isolation. A process control program (PCP) developed from suitably qualified WAP-generated data would then define the ranges of acceptable compositional variation for that type of glass so that the glass produced has the desired waste form characteristics.

Regulatory concerns similar to those described above have been brought to the attention of DOE on a number of occasions since the inception of the HLW repository program. Our response by letter from H. Miller to R. Stein, dated December 16, 1985, to DOE's August 15, 1985, transmittal of the WAP (by letter from R. Stein to R. Browning and referenced earlier herein), is particularly relevant in this regard. That response summarized a number of activities that DOE should perform prior to finalizing the design of the waste form. Included were: 1. establish a quality assurance program; 2. allocate performance, i.e., specify the design objectives of the waste package and its component parts; 3. select a design reliability target for the waste package and its component parts; 4. specify a method for assessing the performance of the waste package and its component parts; 5. identify the data base required to support the performance assessment and the data base that exists; and 6. identify a plan and a schedule for acquiring additional data that may be needed.

It is evident from the forgoing discussion and referenced correspondence that a misunderstanding has developed with respect to DOE's approach to the waste acceptance process. Consequently, the staff strongly urges DOE to provide the NRC with an updated version of the WAP and its baseline documentation (e.g., Waste Acceptance Requirements document) and WAP implementation schedules at an early date in order to assure that adequate staff resources will be available to proceed with the desired level of document review. If you have any questions, please feel free to contact the cognizant NRC Project Manager, Robert Carlson, who can be reached at (301) 504-2435.

Sincerely,

Joseph J. Holonich, Director  
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