



Department of Energy

Washington, DC 20585

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Mr. Joseph J. Holonich, Director
Repository Licensing & Quality
Assurance Project Directorate
Division of High-Level
Waste Management
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Holonich:

This is in response to your letter dated May 19, 1992 regarding waste acceptance process issues. The U.S. Department of Energy (DOE) is well aware of the regulatory requirements contained in 10 CFR Part 60 with regard to the Engineered Barrier System (EBS) and the requirements governing the contents of the license application. These will be factored into the design of the EBS.

There has been extensive correspondence between DOE and NRC on the subject of waste glass. In your letter, you indicated that DOE should not consider the glass waste form as a "given", whereas spent fuel can be considered as a "given", because NRC believes that "glass can be truly designed as an important barrier in the waste package system".

DOE's waste package development program has always been based on considering the glass waste form as a "given". It was never the intent of DOE to further engineer the waste glass from the standpoint of waste isolation. However, since DOE tentatively allocated performance for both spent fuel and glass per the Site Characterization Plan, DOE has requested that the Office of Environmental Restoration and Waste Management (EM) characterize the glass in order that future performance assessments of the waste form can be conducted in the overall assessment of the waste package and EBS performance. Currently, the only NRC requirement which relates directly to the High-Level Waste (HLW) glass is 10 CFR Part 60.135 - Design Criteria for the Waste Package. These requirements apply primarily to the waste package, but section (c) does constrain certain glass characteristics, namely solidification, consolidation, and combustibles. The remaining NRC requirements from 10 CFR Part 60 apply to the waste package, the EBS, or the accessible environment. For example, any discussion of alternatives

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required by 10 CFR Part 60.21(c)(1)(ii)(D) would be limited to the discussion of alternatives with respect to EBS design, and not the waste form. DOE considers this and other NRC requirements to include a contribution from the waste form, but the requirements do not apply solely to the waste form.

The vitrified HLW will, of necessity, be produced long before sufficient materials testing, site characterization and performance assessment can be accomplished in order to proceed with a license application, should the site under consideration be found suitable. The Defense Waste Processing Facility (DWPF) has completed all design activities and facility construction and is expected to perform hot start-up operations in FY 1994. In contrast, the characterization of Yucca Mountain is not expected to be completed before 2001. Any DWPF design changes, based on repository or transportation interfaces, would be unlikely prior to hot start-up due to the limited information likely to be available from site characterization activities, especially with the Office of Civilian Radioactive Waste Management (OCRWM) emphasis on the early establishment of whether or not the site is suitable. In addition, the potential cost and schedule impacts to DWPF, based on changes in waste acceptance requirements, would most likely be unjustified.

DOE is responsible for accepting the glass waste into the Waste Management System. In a 1982 waste form decision, DOE selected borosilicate glass as the waste form for the DWPF, West Valley Demonstration Project (WVDP), and Hanford Waste Vitrification Plant (Hanford). The following brief history regarding the selection process for the 1982 decision would serve to illustrate our position.

Extensive information on borosilicate glass was available through U.S. and international studies prior to 1978. France began operations at the world's first facility for the production of borosilicate glass at Marcoule in July 1978. The U.S. decided to thoroughly review the alternatives before making a final decision on the waste form for immobilization of HLW. That was accomplished through DOE's National High-Level Waste Technology Program between 1978 and 1981. This program sponsored research and development on proposed waste forms at commercial and industrial laboratories, at Universities, and at several DOE sites. The list was narrowed down to seven candidate waste forms. Waste-specific evaluations of the seven candidate waste forms were conducted at DWPF, Idaho National Engineering Laboratory, and Hanford. To obtain an independent review, DOE constituted an independent panel, called the Alternative Waste Form Peer Review Panel, headed by Dr. L.L. Hench of the University of Florida. The Hench panel considered various factors such as leach resistance, waste loading, mechanical strength, radiation stability, and thermal stability, and ranked the waste forms, with borosilicate glass as number one. After an

extensive National Environmental Policy Act (NEPA) process, DOE selected borosilicate glass as the waste form for the DWPF, WVDP, and Hanford. (Federal Register Notice, July 1982).

DOE hopes the above discussion helps illuminate how borosilicate glass was selected as the preferred waste form long before the promulgation of 10 CFR Part 60.

DOE has developed several leach tests to compare the short-term leachability/durability of borosilicate glass. Such tests include Materials Characterization Center (MCC-1 and MCC-3) leach tests and the Product Consistency Test (PCT). These tests allow a comparison between leached concentrations of key elemental components in HLW glass (e.g., boron, lithium) and glass short-term durability and consistency. The original baseline borosilicate glass was formulated during the development of the Savannah River Environmental Assessment (EA) and is referred to as EA reference glass (see Environmental Assessment; Waste Form Selection for SRP High-Level Waste", DOE/EA-0179, July 1982). The expected formulations for the DWPF and WVDP glasses have been demonstrated to exceed the performance of the EA reference glass in all leachability tests thus far. The DOE Office of Environmental Restoration and Waste Management is currently preparing a compendium on nuclear waste borosilicate glass which provides a scientific basis for evaluating the behavior of HLW glass under storage, transportation and geologic conditions. This compendium will be transmitted to the NRC upon completion.

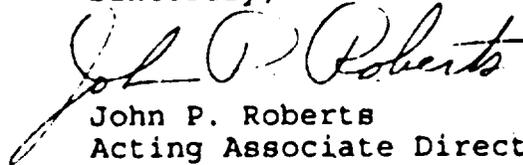
In addition, the U.S. Environmental Protection Agency (EPA) identified vitrification as Best Demonstrated Available Technology (BDAT) for mixed radioactive waste liquids (Federal Register 55 FR 22626, June 1, 1990). This was based on data from DOE, including Savannah River, on liquid slurry and vitrified glass characteristics. The reprocessing waste is considered hazardous because it is EP toxic and corrosive. The EPA concluded that "vitrification will provide effective immobilization of the inorganic constituents (i.e., both radioactive and RCRA hazardous) in high-level mixed waste generated during the reprocessing of fuel rods". This EPA position is based on the leach test results of borosilicate glasses using various MCC-3-type tests (grind and leach). The EPA determination means that vitrified HLW glass is suitable for land disposal.

Enclosed is the DOE Waste Acceptance System Requirements Document (WASRD), Revision 0, dated January, 1993 and published by DOE in February, 1993. The Waste Acceptance Preliminary Specifications were withdrawn in April, 1992 by the Program Change Control Board. The WASRD imposes requirements on the producer to ensure that necessary requirements are established between the Civilian Radioactive Waste Management System and external interfaces. These interfaces include waste form characteristics, waste acceptance criteria, and producer information and reporting requirements. Specific requirements of 10 CFR Part 60.135(c) are allocated primarily to the waste producers. Other regulatory requirements are partially allocated to the waste producers to ensure that physical characteristics of the waste are bounded or documented such that regulations applicable to OCRWM facilities will be met.

As specified in the WASRD, EM will describe its compliance approach with the requirements in the WASRD in its Waste Form Compliance Plan. The actual data and test results verifying compliance will be documented in the EM Waste Form Qualification Report.

If you have any questions, please contact Cori Macaluso of my staff on 586-2837.

Sincerely,



John P. Roberts
Acting Associate Director for
Systems and Compliance
Office of Civilian Radioactive
Waste Management

Enclosure: As stated

cc:

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