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U.S. Nuclear Regulatory Commission
ATTN: Mrs. Deborah A. DeMarco
Two White Flint North
11545 Rockville Pike
Mail Stop T8 A23
Washington, DC 20555

Subject: Programmatic review of ICG XIX International Congress on Glass Conference abstract titled "High-Level Waste Glass Dissolution Process, Models, and Performance in the Repository Environments"

Dear Mrs. DeMarco:

The enclosed abstract for presentation at the ICG XIX International Congress on Glass Conference to be held on July 1–6, 2001 in Edinburgh, Scotland is being submitted simultaneously to you for programmatic review and the ICG organizing committee for approval as an invited talk. If this abstract is found to be programmatically unacceptable, it will be withdrawn from the conference. Attendance to the ICG XIX has been approved under the projected foreign travel for FY 2001.

Please advice me of the results of your programmatic review. Your cooperation in this matter is appreciated.

Sincerely yours,

Budhi Sagar
Technical Director

BS:VJ:jg

Enclosure

cc: J. Linehan, T. Ahn, B. Meehan, E. Whitt, T. Essig, T. Bloomer, K. Stablein, J. Greeves, C. Greene, J. Thomas, J. Andersen, J. Holonich, B. Leslie, W. Patrick, CNWRA Dirs., CNWRA EMs, P. Maldonado, T. Nagy (contracts)

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HIGH-LEVEL RADIOACTIVE WASTE GLASS DISSOLUTION PROCESS, MODELS, AND PERFORMANCE IN REPOSITORY ENVIRONMENTS

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ABSTRACT

When any glass comes in contact with a gaseous or liquid environment, such as flowing or stagnant groundwater, corrosive gases and vapors, or aqueous solutions, chemical reactions occur at the surface, and then extend to the whole volume of the glass, depending on its composition, the pH and chemical composition of the solution or gas, and the temperature and flow rate of the environment. The modern understanding of chemical durability of glasses, developed in the last 30 years, has been focused on two aspects. First, the ability to predict glass durability and produce glasses to meet specific leaching criteria based on short-term tests, and, secondly, the ability to predict the long-term dissolution behavior of glasses. Since glass corrosion reflects the interaction of the environment with a solid material, the observed dissolution behavior depends on test conditions and test methods. Several methods have been developed for accelerated testing to determine the corrosion behavior of glasses. Various test methods that form the basis of the current understanding, as well as relationships between glass composition and environment variables (pH, temperature, and nature of solution), will be discussed. For the high-level radioactive waste (HLW) glasses, the rate of radionuclide release as a result of leaching of its components is important to the performance. Mechanistic and empirical models accounting for the intrinsic dissolution rate, activation energy, and pH dependance will be presented. These models are used to evaluate radionuclide release from the glass waste form. Given the limited data on long-term glass behavior and the associated uncertainties, a risk-informed performance-based approach, based on total system performance analysis, is used for the predicting the long-term performance (in the order of 10,000 yr or more) of the glass waste form in the proposed HLW geologic repository at Yucca Mountain, NV.

DISCLAIMER

This work was performed for the Nuclear Regulatory Commission under Contract No. NRC-02-97-009. This work is an independent product of the Center for Nuclear Waste Regulatory Analyses and does not necessarily reflect the views or regulatory position of the Nuclear Regulatory Commission.