UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 22, 1999

Dr. Narasi Sridhar, Element Manager
Corrosion Science and Process Engineering
Center for Nuclear Waste Regulatory Analyses
6220 Culebra Road, Building 189
San Antonio, Texas 78238-5166

SUBJECT: ACCEPTANCE OF INTERMEDIATE MILESTONE 1402-571-930, "EFFECTS OF ENVIRONMENTAL FACTORS ON THE AQUEOUS CORROSION OF HIGH-LEVEL RADIOACTIVE WASTE CONTAINERS - EXPERIMENTAL RESULTS AND MODELS"

Dear Dr. Sridhar:

Container Life and Source Term (CLST) staff have reviewed the report, "Effects of Environmental Factors on the Aqueous Corrosion of High-level Radioactive Waste Containers-Experimental Results and Models," submitted to me by your letter dated September 23, 1999. The work performed by the Center for Nuclear Waste Regulatory Analyses, on the factors of aqueous corrosion of Alloy 22 as a high-level waste container material, was well done, and provided information that is pertinent to the continuing development of the Total System Performance Assessment code for determining corrosion rates. The objective of presenting results of experimental investigations on passive dissolution, localized crevice corrosion and stress corrosion cracking of Alloy 22 in Cl solutions under a range of environmental conditions has been met, new questions were raised, and some inconsistences in previous research data were examined.

The experimental work done by the Center on waste package (WP) materials and effect of welds in aqueous environments summarized in this report is outstanding. This information, together with results of other relevant work from the literature and discussion of U.S. Department of Energy (DOE) studies on these materials, makes for an excellent report. This work is important to establishing a scientific basis for predicting the lifetime of waste packages containing spent nuclear fuel to be disposed in the proposed repository at Yucca Mountain by DOE. The lifetime of the WP is an issue of extremely high concern since it is a key barrier to preventing release of radionuclides, and is therefore important to the performance of the repository. Given the importance of the WP and the long time period during which it is expected to perform, accurate modeling of failure mode and corrosion rate is imperative. Failure modes will depend on the near field environment to a certain extent. Prediction of the near field environment is beyond the scope of this report; however, environments tested are considered bounding of the environment expected to evolve in the repository.

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Staff is concerned about the discrepancy of several hundred millivolts between the E_{rcrev} measured in the autoclave and glass cell systems. If it is a matter of silica content, silica can be added to the autoclave system to test this hypothesis. Perhaps the discrepancy is due to oxygen levels in solution since the solubility of oxygen is decreasing as temperature approaches 100°C and the two tests are performed at different pressures. It is also possible that something in the autoclave is acting as a catalyst. Staff strongly recommends that the inconsistencies found between the E_{rcrev} for glass and that found for the autoclave system, be resolved.

This document is acceptable and fulfills the requirements set forth in the FY 1999 Operations Plans for the CLST Key Technical Issue. This version will be placed in the Public Document Room. If you or the authors of the journal paper have any questions, please contact me at (301) 415-5874.

Sincerely,

B. J. Davis

B. Jennifer Davis
Program Element Manager
High-Level Waste and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: J. Linehan
B. D. Meehan

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Sincerely,

[ORIGINAL SIGNED BY]

B. Jennifer Davis
Program Element Manager
High-Level Waste and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: J. Linehan
B. D. Meehan

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