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June 7, 2001  
Contract No. NRC-02-97-009  
Account No. 20.01402.571

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 an abstract

Dear Mrs. DeMarco:

The enclosed abstract is being submitted for programmatic review. The abstract will be submitted for presentation at the 25<sup>th</sup> International Symposium on the Scientific Basis for Nuclear Waste Management of the MRS 2001 Fall Meeting to be held November 26–30, 2001 in Boston, Massachusetts. The title of this abstract is:

“Evolution of Water Chemistry through Interactions with Waste Package” by Y.-M. Pan, D.S. Dunn, C.S. Brossia, G.A. Cragolino, V. Jain, and N. Sridhar.

This paper is a result of the activities conducted in FY2000 and FY2001 under task 01402.571 to resolve the issue related to the effects of engineering materials on the chemistry of water.

Sincerely,

  
Budhi Sagar  
Technical Director

Enclosure

BS:VJ:jg

|     |            |             |             |             |                     |            |
|-----|------------|-------------|-------------|-------------|---------------------|------------|
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MRS 2001 Fall Meeting  
The 25<sup>th</sup> International Symposium on the Scientific Basis for Nuclear Waste Management  
November 26-30, 2001  
Boston, Massachusetts

## EVOLUTION OF WATER CHEMISTRY THROUGH INTERACTIONS WITH WASTE PACKAGE

Y.-M. Pan, D.S. Dunn, C.S. Brossia, G.A. Cragnolino, V. Jain, and N. Sridhar  
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### Abstract

The chemistry of water dripping into waste package (WP) is important to the performance of engineered barriers and the subsequent release of radionuclides to the environment. A corrosion test cell that simulates the internal geometry of the WP has been designed to investigate changes to the in-package solution chemistry. A series of tests was conducted to evaluate solution chemistry variations as a function of applied potential, temperature, and chloride concentration using a specimen of type 316L stainless steel (SS) with a predrilled hole as a simulated pit. A micro-syringe was used to extract solutions from inside and outside the pit. The solutions were analyzed for cation concentrations using capillary electrophoresis and the pH was measured using a micro-electrode. Preliminary measurements showed substantially high cation concentrations inside the pit due to anodic dissolution of type 316L SS. The solution pH became considerably acidic reaching a value of 2.6. These results suggest that interactions of WP internal structural components with the incoming water may have significant influence on the evolution of water chemistry and the subsequent corrosion of waste forms such as spent nuclear fuel.

Disclaimer: This paper was prepared to document work 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.