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September 20, 2010
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Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
Mrs. Deborah DeMarco
Office of Nuclear Material Safety and Safeguards
Division of High-Level Waste Repository Safety
Mail Stop EBB-2-B02
Washington, DC 20555

Subject: An Electrochemical Study on Passivation of Alloy 22 in Chloride-Containing Solutions
With and Without Sulfur—Letter Report (IM 14002.01.012.020)

Dear Mrs. DeMarco:

This letter transmits the subject report. Please note that the title of the report has been changed from Effect of Sulfur on the Passivation of Iron-Nickel Alloys, Especially Alloy 22 to more accurately reflect the nature of the work reported.

This report, which is part of the knowledge management activities for the high-level waste repository safety program, documents a set of previously unpublished results from recent corrosion tests that used electrochemical methods and thermodynamic computations to evaluate the potential for enhanced passive dissolution of Alloy 22 in the presence of sulfur. The test results indicated that (i) an observed increase in the anodic current of Alloy 22 during the tests was due to oxidation of sulfur species in solution and was not due to the dissolution of Alloy 22, (ii) the Alloy 22 passive film was not compromised by the high concentration of sulfide in the test solution, and (iii) the general corrosion rate of Alloy 22 did not increase under the test conditions.

The information presented in the report supports the risk-informed and performance-based review of the degradation of engineered materials in the Yucca Mountain license application and has potential application to the performance of Alloy 22 in other low-temperature geochemical environments.



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The subject report is the first to be completed under knowledge management activities this fiscal year, and many such reports are being planned for next year. Therefore, in addition to any comments or questions regarding the technical content of the report, we would welcome any suggestions or comments on the structure, focus, or format that we could use to improve subsequent reports.

Please contact me at (210) 522-5054 if you have any questions regarding this report.

Sincerely yours,



Pat Mackin
Director of Administration

PM/nn
Enclosure

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