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MEMORANDUM FOR: Michael J. Bell, Chief
 High-Level Waste Licensing
 Management Branch
 Division of Waste Management

FROM: F. Robert Cook
 High-Level Waste Licensing
 Management Branch
 Division of Waste Management

SUBJECT: MATERIALS RESEARCH SOCIETY ANNUAL MEETING, NOVEMBER
 1982, AND REVIEW OF BROOKHAVEN NATIONAL LABORATORY HIGH
 LEVEL WASTE RESEARCH PROGRAM - REPORT OF TRIP

A. MRS Meeting Report

Papers presented at the Materials Research Society Annual Meeting in the area of High-Level Waste covered little new research work. Many papers were reports of work done in the past or details of continuing research.

Highlights of these papers are summarized in a report prepared by E. A. Wick for Sessions on November 1 and 2, 1982, and hereunder for Sessions on November 3 and 4, 1982. Abstracts of all papers are contained in a booklet provided by MRS and on file in F. R. Cook's office.

1. A computer program was described which gave predictions of radiolytic products which form in bentonite packing materials. The program also handles the migration of hydrogen out of the packing. The calculations show that the production of hydrogen will far exceed the diffusions, so that hydrogen gas bubbles will form in the bentonite after about 1 year. The oxidation of Fe²⁺ to Fe³⁺ is also addressed by this program.

The program appears to be a useful tool for predicting the accumulation of radiolytic products in packing material. We should ask Brookhaven to obtain the program. The paper discussed above was

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entitled, "Radiolysis of Groundwater From HLW Stored in Copper Canisters," by H. Christensen.

- 2. An analytic model for treating transport of radionuclides in an engineered barrier system was presented by Constance W. Miller of LBL, "Towards a Comprehensive Model of Chemical Transport in Pores Media." This analysis included consideration of dispersion/diffusion, convection, complexation, sorption and precipitation processes.

It appears to be of use for evaluation of packing in the waste package. The program will be obtained by SNL (Siegel), per conversation with Cook on January 26, 1983.

- 3. A paper by John K. Bates of ANL was presented which presents an analysis for predicting hydration of waste glass. The analysis will be useful for determining the degradation of glass exposed to hydrothermal conditions in a repository.
- 4. A paper by James A. Ruppen of SNL, "Some Effects of Microstructure and Chemistry on Corrosion and Hydrogen Embrittlement of TiCode-12," indicated that TiCode-12 is subject to corrosion sensitization and hydrogen embrittlement at hydrogen concentrations as low as 220 ppm by weight. The mechanism described for embrittlement was stress-induced hydride formation.

The paper should be reviewed by BNL. Wick will take action to request this review.

- 5. A paper by V. Mirschinka et al., "Investigations of Suitable Metallic Container Materials For HLW Solidification," presented data which indicated that chromium from canisters was released to glass poured into them and caused blistering in the glass matrix.

This interaction should be investigated since it may influence the integrity of glass to subsequent leaching. BNL should be requested to obtain the paper and evaluate the use of chromium containing alloys for canisters. Wick will request this action.

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B. Report of Trip to Brookhaven National Laboratory with M. McNeil (NRC/RES) on November 5, 1982

The purpose of the meeting with BNL was to review the research task concerning TiCode-12 corrosion mechanisms.

Data from the crevice corrosion test at BNL was reviewed and plans for testing in FY83 were discussed. The following comments were made to BNL concerning their test plans:

1. Measurement of the chemistry of the crevice should be made to confirm calculations of the chemistry within the crevice. In particular pH and Cl⁻ should be checked to see whether there is a correspondence with the theory.
2. Testing for hydride embrittlement should obtain local measurement of hydride formation at "brittle" locations rather than correlating brittleness to average H₂ uptake by the specimen.
3. Cook (NRC) made the point that DOE was no longer placing a heavy emphasis on TiCode-12 and requested that research shift to understanding how conditions typical of a repository affect pitting corrosion rates in carbon steel and cast irons. McNeil (RES) advised that he would further consider this point, however, he believed that TiCode-12 was still an important alternate container material being considered by DOE and that TiCode-12 investigations should continue.

Original Signed By:

F. Robert Cook
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Enclosure:
Meeting Paper Abstracts

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