

June 15, 1987



UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

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Mr. Everett A. Wick
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Monthly Letter Status Report for May 1987 (FIN-A-4171-6)

Dear Mr. Wick:

Enclosed is the May 1987 monthly progress report for the project
"Evaluation and Compilation of DOE Waste Package Test Data"
(FIN-A-4171-6). The financial information is reported separately.

Sincerely,

Charles G. Interrante

Charles G. Interrante
Program Manager
Corrosion Group
Metallurgy Division

Enclosures

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WM Project: WM-10, 11, 16
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WM Record File: A4171
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Monthly Letter Report for May 1987

Published June 1987

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Performing Organization: National Bureau of Standards (NBS)
Gaithersburg, MD 20899

Sponsor: Nuclear Regulatory Commission (NRC)
Office of Nuclear Materials Safety and Safeguards
Silver Spring, MD 20910

TASK 1 -- Review of Waste Package Database and High Level Waste Data Center

WERB Reviews -- The semi-annual report covering the period August 1986 to January 1987 as approved by the Washington Editorial Review Board (WERB), was submitted to NRC on May 30, 1987.

Work continued on the software development for the database management system used for this work. Help screens for database users were further developed. Other changes in the software were aimed at such problems as (1) facilitating updates of the "keyword checklist tree", (2) assuring that modifications made by systems analysts could not carelessly be overwritten, and (3) the ease and reliability with which the Bernoulli disks sent to the NRC can be updated with the latest approved reviews.

Status of Reviews

SRP -- Review is continuing on the following reports.

1. BMI/ONWI-592, "ERG Review of Salt Constitutive Law, Salt Stress Determinations and Salt Corrosion Modeling Studies," March 1986
2. BMI/ONWI-612, "The Effects of Stabilizers on the Heat Transfer Characteristics of a Nuclear Waste Canister," July 1986
3. BMI/ONWI-597, "Buckling Design Criteria for Waste Package Disposal Containers in Mined Salt Repositories," December 1986
4. DOE/CH-21, "Systems Engineering Management Plan for the Salt Repository Project," August 1986

5. UCRL-53726, "Reference Waste Package Environment Report," October 1986
6. "Radiation Damage Studies on Natural Rock Salt from Various Geological Localities of Interest to the Radioactive Waste Disposal Program," Nuclear Technology, 60, 231-243, February 1983
7. BMI/ONWI-626, "ERG Review of the SRP Salt Irradiation Effects Program," November 1986
8. BMI/ONWI-611, "ERG Review of Waste Package Container Materials Selection and Corrosion," July 1986

SRP -- Review has been initiated on the following report.

1. BMI/ONWI-583, "Waste Package Materials Testing for a Salt Repository: 1983 Status Summary Report," September 1986

BWIP -- Review is continuing on the following reports.

1. RHO-BW-SA-391P, "Effect of Grande Ronde Basalt Groundwater Composition and Temperature on the Corrosion of Low-Carbon Steel in the Presence of Basalt-Packing," August 1985
2. RHO-BW-SA-316, "Irradiation-Corrosion Evaluation of Metals for Nuclear Waste Package Applications in Grande Ronde Basalt Groundwater," November 1983
3. SD-BWI-TS-008, "Slow-Strain-Rate Testing of 9% Cr, 1% Mo Wrought Steel and ASTM A27 Cast Steel in Hanford Grande Ronde Groundwater," October 1984
4. RHO-BW-SA-509P, "Thermal Analysis of Waste Package Preliminary Reliability Assessment," March 1986
5. B047154, "BWIP General Corrosion Studies, Summary Report of Activities in FY-1984,"
6. SD-BWI-TS-012, "Short-term Stress-Corrosion-Cracking Tests for A36 and A387-9 Steels in Simulated Hanford Groundwater," January 1985
7. SD-BWI-TI-165, "Technical Progress Report on BWIP Canister Materials Crack Growth Study for FY 1983," January 1984
8. RHO-BW-CR-148P, "REPREL Computer Code: User Guide," June 1985
9. RHO-BW-SA-560P, "Status of Environmentally Assisted Cracking Studies by the Basalt Waste Isolation Project," Symposium on Radioactive Waste Management '86, March 1986
10. "Electromechanical Testing of AISI 1020 Steel in Hanford Grande Ronde Groundwater," S. G. Pitman, July 1983

BWIP -- Review has been initiated on the following report.

1. RHO-BW-LD-48, "Sorption Behavior of Selected Radionuclides on Columbia River Basalts," August 1986

NNWSI -- Review is continuing on the following reports.

1. UCRL-15723, "NNWSI Waste Form Test Method for Unsaturated Disposal Conditions," March 1985
2. UCID-20847, "Feasibility Assessment of Copper-Base Waste Package Container Materials in Tuff Repository, September 1986
3. HEDL-7560, "Test Plan for Long-Term Low-Temperature Oxidation of Spent Fuel Series 1", June 1986
4. UCRL-53631, "Reaction of Topopah Spring Tuff with J-13 Water: A Geochemical Modeling Approach Using the EQ3/6 Reaction Path Code," November 1985
5. UCRL-94708, "Carbon-14 in Waste Packages for Spent Fuel in a Tuff Repository," October 1986
6. UCRL-15825, "The Effect of Gamma Radiation on Groundwater Chemistry and Glass Leaching as Related to the NNWSI Repository Site," May 1986
7. ANL-85-41, "One-Year Results of the NNWSI Unsaturated Test Procedure: SRL 165 Glass Application," August 1984
8. UCRL-53179, "Radiation Chemical Effects in Experiments to Study the Reaction of Glass in an Environment of Gamma-Irradiated Groundwater and Tuff," May 1986
9. UCRL-94633, "Experimental Study of the Dissolution Spent Fuel at 85°C in Natural Groundwater," December 1986
10. UCRL-95962, "Hydrogen Speciation in Hydrated Layers on Nuclear Waste Glass," January 1987
11. UCRL-94658, "Integrated Testing of the SRL-165 Glass Waste Form," December 1986
12. UCRL-91258, "Leaching Savannah River Plant Nuclear Waste Glass in a Saturated Tuff Environment," November 1984
13. DP-MS-85-141, "Leaching Fully Radioactive SRP Nuclear Waste Glass in Tuff Groundwater in Stainless Steel Vessels," May 1986
14. UCID-20895, "Application EQ3/6 to Modeling of Nuclear Waste Glass Behavior in a Tuff Repository," May 1986

NNWSI -- Review has been initiated on the following reports.

1. "Spent Fuel as a Waste Form - Data Needs to Allow Long Term Performance Assessment Under Repository Disposal Conditions," V.M. Oversby, 1968
2. UCRL-92891, "LWR Spent Fuel Characteristics Relevant to Performance as a Wasteform in a Potential Tuff Repository," June 1985
3. ANL-84-81, "NNWSI Phase II Materials Interaction Test Procedures and Preliminary Results," January 1985

GLASS -- Review is continuing on the following reports.

1. "Chemical Durability Studies on Glass Compositions Pertaining to Waste Immobilization at West Valley," A. Barkatt, et al., Waste Management 1986
2. "Long Term Leach Behavior of West Valley HLW Glasses," P.B. Macedo, et al., ANS Spectrum, 1986
3. "Leach Mechanisms of Borosilicate Glass Defense Waste Forms - Effects of Composition," A. Barkatt, et al., no date
4. "Chemical Determination of West Valley Waste Form Products," D. M. Oldman, J. R. Stimmel, and J.H. Marlow, no date
5. "Startup and Initial Experimental Results for the West Valley Vitrification Demonstration Project, Waste Management '86: Waste Isolation in the U.S. Technical Programs and Public Education Volume 2 High-Level Waste; Proceedings of the Symposium on Waste Management, Tucson, AZ, March 2-6, 1986
6. "Method for Showing Compliance with High-Level Waste Acceptance Specifications, Waste Management '86: Waste Isolation in the U.S. Technical Programs and Public Education Volume 2 High-Level Waste; Proceedings of the Symposium on Waste Management, Tucson, AZ, March 2-6, 1986
7. "Solubility Tests on Borosilicate Glasses for West Valley Waste Immobilization, High-Level and Transuranic Waste Management," X. Feng and A. Barkatt, ANS Transactions, 1986
8. PNL-4382, "Workshop on the Leaching Mechanisms of Nuclear Waste Forms," Summary Report, May 19-20, 1982
9. "Effects of Composition on the Leach Behavior of West Valley HLW Glasses," X. Feng, et al., no date
10. PNL-5157, "Final Report of the Defense High-Level Waste Leaching Mechanisms Program," August 1984

11. WVDP-056, "Description of the West Valley Demonstration Project Reference High-Level Waste Form and Canister," July 1986

GLASS -- Review has been initiated on the following reports.

1. "Physical Chemistry of Glass Surfaces," J. Non-Cryst. Solids, 1978
2. "Methods of Simulating Low Redox Potential (Eh) for a Basalt Repository," Materials Research Society Proceedings, 1978
3. "Control of Oxidation Potential for Basalt Repository Simulation Tests," Scientific Basis for Nuclear Waste Management, 1975
4. "Glass Performance in a Geologic Setting," Summer National Meeting of the American Institute of Chemical Engineers, 1986
5. "Repository Simulation Tests," American Ceramic Society Annual Meeting, 1984

OTHER REPORTS/TECHNICAL PAPERS -- Review is continuing on the following report judged to have related scientific value sufficient to warrant its review (as reference material)

1. "Aging Degradation of Cast Stainless Steel," O. K. Chopra and H. M. Chung, October 1986

TASK 2 -- Identification of Additional Data Required and Identification of Tests to Generate the Data

NBS lead workers are continuing their studies concerning the types of additional data and verification tests needed to demonstrate that the DOE waste package designs will meet the performance objectives of 10 CFR 60.

TASK 3 -- Laboratory Testing

NRC approval was given by letter dated May 8, 1987 for initiation of laboratory testing on two proposed topics:

- (1) Effect of Resistivity and Transport on Corrosion of Waste Package Materials, and
- (2) Evaluation of Methods for Detection of Stress Corrosion Crack Propagation in Fracture Mechanics Samples

Equipment for use in these studies is now being assembled and this work was initiated promptly after approval. Work is continuing on the two topics approved earlier:

- (1) Pitting Corrosion of Steel Used For Nuclear Waste Storage, and
- (2) Corrosion Behavior of Zircaloy Nuclear Fuel Cladding

TASK 4 -- General Technical Assistance

Our reply to your request of May 11, 1987 for general technical assistance, rendered under Task 4 of FIN-A-4171-6, on the topic "MCC-D5, One-Year Leach Test Data for ARM-1 Glass," MRB-0530 was transmitted to E. Wick on May 21, 1987.

NBS was represented at the ACRS Subcommittee Meeting on Waste Management on May 18 and 19, 1987 in Washington, DC by Dr. C.G. Interrante, Dr. D. Hall, Dr. R. Shull, Dr. R. Ricker, Dr. E. Escalante, Dr. M. Linzer, Dr. A. Fraker, Dr. E. Plante, and Ms. J. Ruspi.