CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Attendance at the American Society of Testing and Materials (ASTM) C26–13 Repository Waste subcommittee meeting
Charge Number 20.01402.571

DATE/PLACE: June 24–28, 2001, Norfolk, VA

AUTHOR: V. Jain

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PERSONS PRESENT: V. Jain (CNWRA), and T. Bloomer (NRC)

BACKGROUND AND PURPOSE OF TRIP:

The ASTM C26–13 meeting was held June 24–28, 2001, at the Sheraton Norfolk Waterside Hotel in Norfolk, VA. ASTM C26–13 sub-committee is involved in the development of methods for activities related to vitrified waste and spent fuel. The participants included technical staff from national laboratories such as Argonne National Laboratory (ANL), ANL-West, Pacific Northwest National Laboratory (PNNL), Los Alamos National Laboratory, Lawrence Livermore National Laboratory (LLNL); waste form producer, Savannah River Site (SRS); Fuel manufacturers; Utilities; and representatives from CEA (Commissariat à l'énergie Atomique) and COGEMA, France. The purpose of this bi-annual meeting is to define the need for standards, write standard methods, and issue standards for testing and materials. The main purpose of this trip was to participate in the revision of ASTM C 1174 "Standard guide for prediction of the long-term behavior of materials, including waste forms, used in engineered barrier systems (EBS) for geologic disposal of high-level radioactive waste" standard and other standards related to radioactive waste. Author participated in the meeting on June 24 and 25, 2001.

SUMMARY OF PERTINENT POINTS:

The summary provided in this report is based on the author's attendance at selected sessions, and brief notes taken during discussions.

- Status of the draft procedure titled "Standard Practice for Measurement of the Glass Dissolution Rate Using the Single-Pass Flow-Through Test Method" for measuring the forward dissolution rates of waste glasses, necessary for performance assessment modeling, was presented by Steve Johnson (ANL-West). A simple 5 component glass was selected for the round robin. Questions were raised regarding applicability of this glass to simulate HLW glass. In addition, discrepancy in corrosion rates between proposed single-pass-flow-through test and Materials Characterization Center (MCC-1) test on the same sample needs to be resolved before completing the precision and bias analysis and initiating a round robin testing.

- Discussion of the draft standard titled "Standard Test Methods for Determining the Amount of Devitrification in a Nuclear Waste Glass and for Constructing Time-Temperature-Transformation (TTT) Diagrams" was led by Carol Jantzen, Task Group Chair. No new information was presented at the meeting. Carol is, presently, compiling round robin results into ASTM format. In addition, she is incorporating comments received to date into a consolidated electronic format. The Test Method will be balloted before January 2002 meeting.

- Discussion of the draft standard titled "Standard Test Methods for Determining the Liquidus Temperature (T_L) of Waste Glasses" was led by Mike Schweiger (PNNL). Mike cited issues related to the reproducibility of results brought on by on their own samples as a reason for delay in initiating Round Robin. The liquidus temperature measured on the same samples after a period of one or two years were off significantly. PNNL is systematically analyzing all the variables in the system to get to the root cause of this issue. Based on the preliminary results drift in the thermocouple is a major cause of variability in the results. The type of furnace is also contributing to the variability. PNNL plans to initiate round robin before the next ASTM meeting.

- Discussion of the standard Vapor Hydration Test (VHT) procedure for determining the corrosion behavior of glass was led by Mike Schweiger (PNNL). Round robin results for this test showed significant discrepancies. Laboratories had problem in measuring the thickness of the corroded layer. A new round robin will be initiated using a more durable glass to determine the precision and accuracy of the test method. The U.S. DOE Office of River Protection (ORP) does require VHT to be included in the Phase B-2 contract with the River Protection Project-Waste Treatment Plant (RPP-WTP) contractor, i.e. Bechtel National, Inc. for the vitrified low-level radioactive waste.

- Discussion and presentation on proposed additional test protocol(s) to be added to C1285, the product consistency test (PCT) standard, was led by Carol Jantzen (SRS). She provided a quick background of on going activities which include two main areas: (i) extension of the PCT standard to included multi-phase ceramic waste forms such as the glass-bonded sodalite waste form; and (ii) initial results of the round robin tests. Test Method will be balloted after compilation of the Round Robin test results. Suggested changes by the committee members to the Test Method were discussed.

- Balloting result on Test Standard titled "Physical and Chemical Characterization of Radioactive and Hazardous Wastes for Thermal Treatment Exclusive of Incineration" were discussed by Carol Jantzen. The Test Method is being revised to incorporate comments.

- A draft new standard on "Standard Guide for the Characterization of Uranium Metal-Based Spent Nuclear Fuel in Support of Final Repository Disposal" was discussed. Questions were raised on the future use of this standard. This standard is focused on characterization of N-reactor fuel at Hanford. The characterization of N-reactor fuel for dry-storage is complete and there are no other users for it. Authors want this standard to be issued to obtain a consensous standard for characterization of the N-reactor fuel for geologic disposal and support of Repository licensing-related activities.

- Bardy Hanson, PNNL, discussed the status on the draft Standard Test Method for "Measuring the Dissolution Rate of Spent Nuclear Fuel in Dilute Aqueous Solutions Using a Flowthrough

Technique". No changes have been made since 1999 balloting. The negative ballots are still being resolved. The uncertainties cited in the last meeting were reiterated. PNNL is working towards resolving uncertainties associated with various test parameters At the meeting additional issues relating to variability in the U analysis using various techniques, changes in the U concentration in the leachate with time (due to dissolution of colloids in the leachate), and fines from grinding. Brady hopes, based on the current ongoing activities, issues related to spent fuel dissolution will be resolved before the next ASTM meeting and Test Method will be ready for balloting again.

- Tom Thronton, Task group leader for the revision of ASTM C 1174-97 "Standard Practice for Prediction of the Long-Term Behavior of Materials, Including Waste Forms, Used in Engineered Barrier Systems (EBS) for Geological Disposal of High-Level Radioactive Waste" discussed changes made in the standard based on the Draft 10CFR Part 63. Several committee members were in disagreement with the proposed changes. In their opinion, the standard moved towards engineered barriers instead of both engineered barrier and waste forms. In addition, the language used in the revised text was inappropriate. Before, the next ASTM meeting, Carol Jantzen and Ned Bibler (SRS) will provide comments on modeling section. In addition, Vijay Jain suggested that the standard lacks risk information and agreed to revise prediction and uncertainty sections to incorporate Draft 10 CFR Part 63 risk guidance. Tammy Bloomer, NRC suggested that the QA reference cited in the standard in not acceptable to the NRC.

SUMMARY OF ACTIVITIES:

In summary, the development of methods such as vapor hydration test for glasses, forward reaction rate determination for glasses, spent fuel dissolution rate determination using flow through test, revision to the PCT, waste forms, and the revision of the Standard Practice for Prediction of the Long-Term Behavior of Materials, Including Waste Forms, Used in Engineered Barrier Systems (EBS) for Geological Disposal of High-Level Radioactive Waste are important to the NRC in the assessment of the repository performance and should be closely followed.

CONCLUSIONS:

The meeting was very useful in keeping current with the ongoing ASTM activities related to Repository Waste. The participation at the meeting was a good opportunity to gather information and generate discussion on issues important to repository waste.

PROBLEMS ENCOUNTERED:

None.

PENDING ACTIONS:

None.

RECOMMENDATIONS:

None.

SIGNATURES:

Vijay Jain
Manager, Corrosion Science & Process Engineering Element

6/27/01
Date

CONCURRENCE:

Budhi Sagar
Technical Director

6/28/2001
Date

VJ:jg