

**CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

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**TRIP REPORT**

**SUBJECT:** Attendance at the 107<sup>th</sup> Annual Meeting & Exposition of the American Ceramic Society  
Charge Number 20.06002.01.322; AI Number 06002.01.322.506

**DATE/PLACE:** April 9–13, 2005, Baltimore, Maryland

**AUTHOR:** V. Jain

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**PERSON PRESENT:** V. Jain, Center for Nuclear Waste Regulatory Analyses (CNWRA)

#### **BACKGROUND AND PURPOSE OF TRIP:**

The 107<sup>th</sup> Annual Meeting & Exposition of the American Ceramic Society was held April 9–13, 2005, in Baltimore, Maryland. This conference attracted approximately 1,700 delegates, and more than 1,000 technical papers in 29 different symposia were presented.

A symposium on Ceramic/Glass Science and Technology for Nuclear and Environmental Industries was devoted to the presentations and discussions on the nuclear and environmental technology applications; nuclear waste forms and fuels processing technology—ceramic forms, glass forms, and steam reforming; panel discussion on nuclear waste form durability testing and disposal studies; and advances in nuclear wasteform testing and characterization methods. A total of 49 papers were presented in the symposium. The proceedings will be published as Ceramic Transactions by the American Ceramic Society.

The purpose of this trip was to (i) participate in the annual organizational and executive committee meetings of the American Ceramic Society and (ii) attend presentations at technical sessions. The summary provided in this report is based on the author's attendance at selected sessions and brief notes taken during presentations on topics relevant to the U.S. Nuclear Regulatory Commission (NRC).

#### **SUMMARY OF PERTINENT POINTS:**

The panel discussion on nuclear wasteform durability testing and disposal studies was the highlight of the symposium on Ceramic/Glass Science and Technology for Nuclear and Environmental Industries. The panel was moderated by C. C. Herman (Westinghouse Savannah River Company) and consisted of D. M. Strachan (Pacific Northwest National Laboratory), P. McGrail (Pacific Northwest National Laboratory), C. M. Jantzen (Westinghouse Savannah River Company), G. G. Wicks (Westinghouse Savannah River Company), and E. R. Vance (Australian Nuclear Science and Technology Organization). Each panelist provided a 10-minute overview of chemical durability tests developed at their organizations.

- D. M. Strachan provided a historical review of the durability test method development.
- P. McGrail discussed the development of pressurized unsaturated flow (PUF) test for wasteform durability.
- C. M. Jantzen discussed the development and use of a product consistency test for wasteform durability testing.
- G. G. Wicks provided an overview of *in-situ* testing of simulated nuclear waste glasses.
- E. R. Vance discussed leaching properties for qualification of nonvitreous wastefoms.

After the presentations by the panel members, the floor was open to questions. Many topics were fiercely debated. Several discussion topics were relevant to the NRC comments on the U.S. Department of Energy (DOE) Technical Basis Document #7. Panelist P. McGrail indicated that vapor hydration test is useful in analyzing secondary phase formation in glasses. In his opinion, however, the method is not adequate for determining dissolution rate. On the topic of maximum pH attainable in the repository environment, panelist felt that the final pH would depend on the combined release of alkali ions from high-level waste glass that increases the pH and carbon dioxide solubility that lowers the pH. Attendees from Westinghouse Savannah River Company indicated that they have conducted several studies on the cracking of glass inside a canister, including a shipment of glass containers from Westinghouse Savannah River Company, Aiken, South Carolina to Pacific Northwest National Laboratory, Richland, Washington, and back. J. Plodinec (Diagnostic Instrumentation and Analysis Laboratory) indicated that the glass inside the canister was still fairly intact after transportation. I have requested a copy of their report, which will be useful in assessing the impact of high-level waste glass damage during transportation. Other questions asked to the panel members included the role of different test methodologies in the assessment of the high-level waste glasses, the importance of high-level waste glass compared to spent nuclear fuel, and the possibility of high-level waste glass producers to have frequent interactions with the repository program.

S. Marra (Westinghouse Savannah River Company) presented on the status of glass production at the Westinghouse Savannah River Site and indicated that 1.7 million gallons of high-level liquid waste has been processed into approximately 1,000 high-level waste glass containers. G. Smith (Pacific Northwest National Laboratory) provided an overview of the Hanford vitrification plant and indicated that the plant is approximately 50 percent built.

I. S. Muller (Catholic University of America) summarized results of 15-year leaching tests using approximately 100 simulated high-level waste glasses from West Valley program. Statistical tools were used to evaluate the data and to classify glasses into different types of dissolution behaviors. The glasses were categorized either as glasses with low, non-zero, dissolution rate, or glasses that show resumption of dissolution. In the glasses that showed no resumption, the dissolution rate was constant and attributed to the formation of phyllosilicate (smectite-type) phase containing iron, magnesium, and potassium on the exposed surface. In the glasses that showed resumption of dissolution, formation of crystalline aluminosilicate phases of zeolite-type (e.g., phillipsite) were observed on the surface. In some glasses in which the pH evolved to 11 showed resumption of dissolution after 1,000 days.

M. Bliss (Pacific Northwest National Laboratory) presented an overview of radiation detectors and cited high sensitivity and low resolution of current commercial radiation detectors as a key issue that restricts separation of false alarms because of extremely low radiation originating from products such as bananas and tiles.

#### American Ceramic Society Activities

I participated in numerous meetings that supported the development of future meetings of the American Ceramic Society.

I was re-elected by the American Ceramic Society Board of Directors as the Chair of the Meetings Committee for 2005–2006. In this role, I will continue to work with the Minerals, Metals, and Materials Society, ASM International, American Welding Society, and Association for Iron and Steel Technology to develop the joint Annual Material Science and Technology Conference. In addition, I will be responsible for all meetings organized and supported by the American Ceramic Society.

I continue to serve as a program co-chair for the Material Science and Technology 2005 Conference and Exhibition, Pittsburgh, Pennsylvania, September, 25–28, 2005. Approximately 1,100 papers will be presented, including a few from CNWRA. Expected attendance to this conference is 5,000.

#### **CONCLUSIONS:**

The meeting was very useful in keeping current with the ongoing worldwide advancements in wasteforms for the disposal of radioactive wastes. The meeting provided a good opportunity to gather information and generate discussion on nuclear wasteforms and processing technologies. Leadership roles in the professional societies contribute to the visibility and recognition of staff among peers.

#### **PROBLEMS ENCOUNTERED:**

None.

#### **PENDING ACTIONS:**

None.

#### **RECOMMENDATIONS:**

Participation in future meetings is highly recommended.

**SIGNATURES:**

Vijay Jain  
Vijay Jain, Manager  
Corrosion Science & Process Engineering

4/25/2005  
Date

**CONCURRENCE:**

Sitakanta Mohanty  
Sitakanta Mohanty  
Assistant Director  
Engineering and Systems Assessment

4/25/2005  
Date

VJ:SM:jg