



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201
703-235-4473

AGENDA
Summer Board Meeting
Wednesday, June 21, 2017

Courtyard Richland Columbia Point
480 Columbia Point Drive
Richland, WA 99352
509-942-9400

- 8:00 a.m.** **Call to Order and Introductory Statement**
Jean Bahr, Board Chair
- 8:15 a.m.** **Welcoming Remarks**
Jud Virden, Associate Laboratory Director, Pacific Northwest National Laboratory
- 8:20 a.m.** **Modeling of Glass Performance in Repository Environments—An International Perspective¹**
Bernd Grambow, SUBATECH, France
- i. What are the various approaches to modeling glass corrosion in repository environments and how do different countries take account of glass corrosion and radionuclide release in repository performance assessments?
 - ii. What are the remaining technical gaps or uncertainties in understanding and modeling of long-term glass performance in repository environments and how important is glass performance to the overall safety case for different repository designs?
- 8:55 a.m.* *Questions, discussion*
- 9:15 a.m.** **Break**
- 9:30 a.m.** **DOE Strategy for Glass Waste Form Acceptance for Geologic Disposal**
Carol Jantzen, Savannah River National Laboratory
- i. What are the technical bases, including standards, test methods, and use of databases and models, for DOE's criteria for qualifying borosilicate glass waste forms as acceptable for disposal in a geologic repository?

¹ Note: Questions were provided to the speakers in advance to convey the Board's primary interests in the agenda topics and to aid in focusing their presentations.

- ii. What is DOE's technical basis for applying the results of short-term tests on reference glasses or glasses with simplified compositions to assessments of the long-term performance of more chemically complex HLW glasses in repository environments?
- iii. What is known about the influence of glass chemistry on crystallite precipitation during glass production and on glass corrosion, and how are crystallites taken into account in DOE's approach to designing glass for disposal in a repository?
- iv. Are data on natural and archeological glasses used to support DOE assessments of the long-term performance of HLW glass in a repository and, if so, how?

10:05 a.m. Questions, discussion

10:25 a.m. Current Understanding and Remaining Challenges in Measuring and Modeling Long-term Performance of Borosilicate Nuclear Waste Glasses
Stéphane Gin, French Atomic Energy and Alternative Energies Commission

- i. What is the current understanding of the processes responsible for glass corrosion and release of radionuclides into the environment? What experimental data support this understanding? What are the key parameters affecting the rate of each of the processes and how have these been used in models?
- ii. What are the remaining technical challenges to measuring glass corrosion and modeling the long-term performance of borosilicate nuclear waste glasses?

11:00 a.m. Questions, discussion

11:20 a.m. Public Comments

11:35 p.m. Lunch Break (1 hour 10 minutes)

12:45 p.m. Glass Formulation and Durability Studies at the Vitreous State Laboratory
Ian Pegg, Catholic University of America

- i. Describe the results of studies the Vitreous State Laboratory has conducted for the U.S. program and for other countries and how these are shared and used to understand glass corrosion mechanisms and long-term performance in repository environments.

1:15 p.m. Questions, discussion

1:35 p.m. DOE Studies to Improve Understanding of Rate-Limiting Mechanisms under Varying Conditions
Joseph Ryan, Pacific Northwest National Laboratory

- i. From DOE's perspective, what are the most important remaining technical uncertainties or gaps in data and understanding of the long-term performance of HLW glass? How is DOE addressing those uncertainties or gaps?
- ii. What are the status and results of DOE R&D activities to understand and model the long-term performance of borosilicate HLW glass?
- iii. Describe the results of recent DOE studies, if any, on natural and archeological

- analogs of nuclear waste glass. How are the results used to support assessments of the long-term performance of HLW glass?
- iv. How is DOE integrating the results of international R&D activities and activities completed at different national laboratories in the U.S. on nuclear waste glass corrosion into its assessments of HLW glass long-term performance?

2:10 p.m. Questions, discussion

2:30 p.m. Break

2:45 p.m. DOE High-Level Waste Glass Corrosion Model and Its Implementation in Safety Analysis

William Ebert, Argonne National Laboratory

- i. What are the recent improvements in DOE models for HLW glass corrosion? How are these improvements helpful to the DOE HLW geologic disposal program?
- ii. How do the models take account of the important glass corrosion mechanisms and the range of environmental conditions expected for different repository host-rock types and near-field environments? How are environmental conditions such as dissolved organic matter and the presence of microbial life being investigated?
- iii. How do the models take account of the wide range in DOE HLW glass compositions to be produced at the Waste Treatment and Immobilization Plant and the Defense Waste Processing Facility?
- iv. How are the models and model parameters supported by experimental data, including the large database of glass dissolution experiments managed by DOE personnel?
- v. What is DOE's technical basis for using the results of short-term, small-scale tests on glass corrosion to support assessments of long-term glass performance in a repository?
- vi. How are the process-level models of glass corrosion and radionuclide release integrated into repository performance assessments? How important is glass performance to the overall safety case for different repository designs?

3:20 p.m. Questions, discussion

3:40 p.m. Studies on Natural and Archeological Glasses—Opportunities to Learn About Long-term High-Level Waste Glass Corrosion

Aurélie Verney-Carron, University Paris-Est Créteil

- i. What have we learned from studies on natural and archeological glasses regarding the corrosion and long-term performance of nuclear waste glasses?
- ii. Are the rate-limiting mechanisms the same for natural and for nuclear waste glasses? Have researchers found evidence that natural glasses alter in stages such as those observed for nuclear waste glasses? Is there evidence that corrosion rates increase at late stages in natural systems? What corrosion rates have been estimated for natural glasses?
- iii. What causes the large discrepancies between silicate mineral dissolution rates measured in the laboratory and those measured in the field? Is this discrepancy also noted for glassy natural analogs?

- iv. Are the kinetic models used for predicting nuclear waste glass corrosion able to take account of glass corrosion on a geological timescale?

4:10 p.m. Questions, discussion

4:30 p.m. Quick Look at Poster Papers

5:05 p.m. Public Comments

5:20 p.m. Adjourn Public Meeting

5:30 p.m. Poster Session: Research Related to Long-Term Performance of Nuclear Waste Glasses