



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

## AGENDA

### Summer 2022 Board Meeting *September 13–14, 2022*

Holiday Inn National Airport/Crystal City  
2650 Richmond Highway, Arlington, VA 22202

<https://preconvirtual.com/nwtrb-gov-09-13-2022/>

#### **Tuesday, September 13, 2022 (Shenandoah Ballroom)**

- 12:00 p.m. EDT**    **Call to Order and Introductory Statement**  
*Jean Bahr, Board Chair*
- 12:15 p.m. EDT**    **Opening Remarks**  
*William Boyle, DOE, Office of Nuclear Energy*
- 12:25 p.m. EDT*    *Questions, discussion*
- 12:30 p.m. EDT**    **Overview of DOE R&D Efforts Related to a Clay-Based Repository and Clay-Based Engineered Barriers**  
*Chris Camphouse, Sandia National Laboratories*
- TOPICS/QUESTIONS TO BE ADDRESSED:
- What are the key processes that can affect the barrier functions of a clay-based host rock and clay-based engineered barriers?
  - What are the important technical gaps being addressed by the DOE's R&D activities related to a clay-based repository and clay-based engineered barriers?
  - What major advances in understanding behavior of argillite host rocks and clay-based engineered barriers have emerged so far from the DOE's R&D efforts and what are technical gaps that still need to be addressed?
  - How do R&D plans accommodate testing multiple alternative hypotheses and unexpected processes or behaviors?
  - How are the models being developed to enable evaluating different repository design options and different argillite characteristics?
  - How are the numerical models validated and how do you address the data and model uncertainties?
- 1:10 p.m. EDT*    *Questions, discussion*
- 1:30 p.m. EDT**    **Modeling of the Long-Term Integrity of the Argillite Host Rock Barrier**  
*Jonny Rutqvist, Lawrence Berkeley National Laboratory*

TOPICS/QUESTIONS TO BE ADDRESSED:

- How does the numerical modeling approach appropriately account for the range of spatial and temporal scales that need to be modeled?
- Are there sufficient data from laboratory- and field-scale experiments and technical bases to support the models?
- How do the numerical models take account of data and model uncertainties given the need to extrapolate to long timescales?
- If multiple conceptual models match laboratory/field observations, what additional laboratory/field studies could be conducted that might discriminate among models and reduce the problem of non-uniqueness?

2:10 p.m. EDT

*Questions, discussion*

2:30 p.m. EDT

**Break**

2:45 p.m. EDT

**Overview of Engineered Barrier System Function and Design in an Argillite Host Rock**

*Ed Matteo, Sandia National Laboratories*

TOPICS/QUESTIONS TO BE ADDRESSED:

- What are the important technical gaps being addressed by the R&D activities related to clay-based engineered barriers?
- What are the key processes that can affect the barrier functions of the clay-based engineered barriers?
- How are the process models being developed to facilitate evaluating different design options for clay-based engineered barriers (e.g., use of bentonite pellets and bricks or cement/bentonite layers)?

3:25 p.m. EDT

*Questions, discussion*

3:45 p.m. EDT

**A Review of High Temperature Engineered Barrier Systems Experiments**

Part 1 - *Carlos Jové-Colón*, Sandia National Laboratories, and

Part 2 - *Florie Caporuscio*, Los Alamos National Laboratory

TOPICS/QUESTIONS TO BE ADDRESSED:

- What are the important coupled processes being simulated in the laboratory studies and how do these processes impact barrier capability?
- How is knowledge gained from tests at small length (laboratory-scale) and short timescales used to extrapolate to or upscale to larger spatial scales (e.g., repository-scale) and longer timescales? What are the limitations of such extrapolations?
- How does the design of the hydrothermal experiments relate to potential repository environments (e.g., liquid/solid ratio, temperature, water composition)?

4:25 p.m. EDT

*Questions, discussion*

4:45 p.m. EDT

**Public Comments**

5:00 p.m. EDT

**Adjourn Day 1**

**Wednesday, September 14, 2022 (Shenandoah Ballroom)**

**12:00 p.m. EDT Call to Order and Introductory Statement**

*Jean Bahr, Board Chair*

**12:05 p.m. EDT Laboratory Experiments to Understand Coupled Processes in Clay-based Barriers Under High Temperature**

*María Victoria Villar, CIEMAT, Spain*

TOPICS/QUESTIONS TO BE ADDRESSED:

- What key technical aspects need to be considered when studying the effects of coupled processes on clay-based materials in a laboratory?
- What additional factors need to be accounted for when evaluating clay-bearing engineered barriers and host rocks for a high-temperature repository?
- What are the main objectives of the EURAD HITEC project<sup>1</sup> that focuses on improving thermohydrological-mechanical description of clay-based materials at elevated temperatures?

*12:45 p.m. EDT Questions, discussion*

**1:05 p.m. EDT Argillaceous Formations as Barriers to Flow – Knowns and Unknowns**

*Chris Neuzil, Independent Consultant*

TOPICS/QUESTIONS TO BE ADDRESSED:

- What do anomalous pressures observed in shales reveal about their long-term barrier performance?
- What key technical gaps need to be addressed to understand the barrier properties of clay-bearing formations at scales relevant to repository siting?
- What are the technical challenges with characterization of low permeability formations?

*1:45 p.m. EDT Questions, discussion*

**2:05 p.m. EDT Break**

**2:25 p.m. EDT Coupled Thermal-Hydrological-Mechanical-Chemical Processes under High Temperature in Bentonite Buffer: Laboratory Experiments, Field Tests, and Modeling**

*LianGe Zheng, Lawrence Berkeley National Laboratory*

TOPICS/QUESTIONS TO BE ADDRESSED:

- How does the modeling approach consider multiple alternative models for phenomena observed from the experiments?
- How are long-term (e.g., several years) data and multiple types of observations used to improve the robustness of predictive models?
- What are the things that went well in these experiments and what were some challenges and how were these addressed?

*3:05 p.m. EDT Questions, discussion*

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<sup>1</sup> The High Temperature Clay (HITEC) project is one of the research and development projects under European Joint Programme on Radioactive Waste Management (EURAD).

**3:25 p.m. EDT      Integration of Models Related to Clay-Bearing Host Rocks and Engineered Barriers into the Geologic Disposal Safety Assessment (GDSA) Framework**

*Tara LaForce*, Sandia National Laboratories

TOPICS/QUESTIONS TO BE ADDRESSED:

- What metrics are used to evaluate the performance of the argillite host rock and clay-based engineered barriers?
- What is the status of the high-temperature shale repository reference case in the GDSA Framework?
- How do you determine the level of detail (e.g., fully coupled vs. simplified abstraction) of processes necessary to adequately represent the evolution of argillaceous host rocks and clay-based engineered barriers in the GDSA Framework?
- What are the GDSA Framework capabilities that may be necessary for evaluating engineered barrier performance under different disposal options and different argillite characteristics?

*4:05 p.m. EDT      Questions, discussion*

**4:25 p.m. EDT      Public Comments**

**4:45 p.m. EDT      Adjourn Public Meeting**