EARTH & ENVIRONMENTAL SCIENCES

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One of the 17 U.S. Department of Energy national laboratories, Lawrence Berkeley National Laboratory was founded in 1931 on the belief that the biggest scientific challenges are best addressed by teams.

BERKELEY LAB

EESA at Berkeley Lab Nuclear Waste Disposal Research Fact Sheet

Nuclear power is used by many nations around the world, and the solutions these countries have pursued in **permanently isolating** their nuclear waste underground are varied. In addition to obviously different **geographical constraints,** each country has at least some differences in potential repository rock types and repository designs. Each type of rock and design, in turn, has certain **advantages** and **disadvantages** with respect to the disposal of nuclear waste which needs to be safely contained for **hundreds of thousands of years**.

Nuclear Waste Disposal Research at EESA

EESA scientists are collaborating nationally and internationally to secure long-term subsurface disposal of high-level radioactive waste. After being a key contributor to the research and licensing activities for the proposed Yucca Mountain repository, our experts are now conducting research and technology development to enable long-term disposal of used nuclear fuel and wastes in other host-rock environments such as shale, salt rock, or crystalline rock.

Contact Liange Zheng at lzheng@lbl.gov for more information.

Berkeley Lab Nuclear Waste Safe Storage and Disposal Research at a Glance

EESA research on waste disposal is organized by potential host rocks (clay rock, crystalline and salt) as natural barriers and bentonite and other materials as engineered barriers. Studies range from fundamental understanding via microscopic modeling and laboratory experiments to large scale coupled process modeling integrated with field tests.

Berkeley Lab scientists collaborate with international partners in the analysis and simulation of large-scale heater tests conducted in underground research laboratories such as FEBEX in *situ* test at the Grimsel, Switzerland and FE heater test at Mont Terri Rock laboratory. The data collected in these long-term tests were used to validate the complex simulation models needed to predict the coupled thermal-hydro-mechanical-chemical processes occurring upon the disposal of heat-producing waste.

Berkeley Lab is leading the international DECOVALEX Project, which currently involves 14 partner organizations from from Europe, Asia, and the Americas. DECOVALEX, which stands for “Development of Coupled Models and Their Validation against Experiments,” focuses on the comparative evaluation of sophisticated coupled-processes modeling challenges related to nuclear waste disposal, involving complex field and/or laboratory experiments in geological systems.

Nuclear Waste Safe Storage Research at AGU

Illitization in Bentonite and its Effect on Stress Revealed by Coupled THMC Models for a Nuclear Waste Repository in Clay
Presentation: H41G-1734
Presenter: Liange Zheng

Thermally-Induced Alteration of Engineered and Natural Barriers for Geologic Disposal of High-Level Radioactive Waste: Integration of THMC Simulation and In *Situ* Testing
Presentation: MR13A-07
Presenter: Jens Birkholzer

Coupled Thermo-Hydro-Mechanical Processes and Key Technical Issues Associated with Nuclear Waste Disposal in Different Host Rocks
Presentation: MR13A-08
Presenter: Jonny Rutqvist

Development of a Reduced-Order Model Approach for Connecting Coupled Thermal, Hydrological and Chemical Model for Transport of U(VI) in Bentonite Buffer and Argillite Host Rock and Performance Assessment of a Generic Nuclear Waste Repository Case
Presentation: MR11C-0049
Presenter: Dinara Ermakova

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