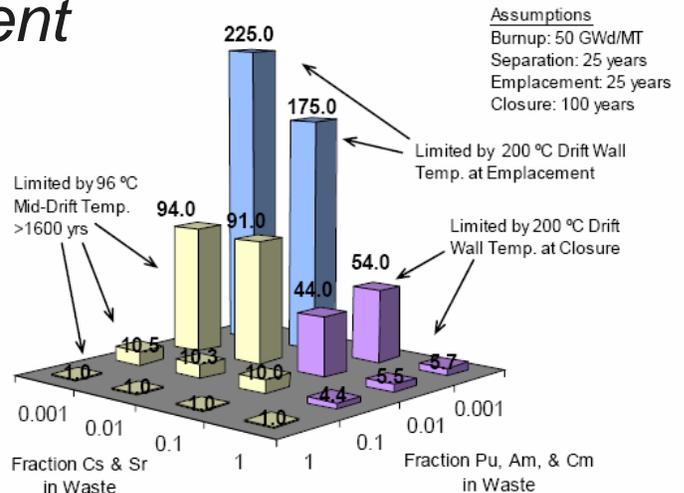


Nuclear Waste Management

Nuclear Engineering (NE) Division researchers participate on both the Department of Energy Office of Civilian Radioactive Waste Management's Yucca Mountain Project and the Office of Nuclear Energy's Advanced Fuel Cycle Initiative (AFCI) and Global Nuclear Energy Partnership (GNEP) programs. Efforts range from the development of models and conduct of analyses to participating in the development of waste management and disposal strategies.

Specific modeling and analysis activities include:

- Participate in the modeling and assessment of the metal and ceramic waste forms, which incorporate the radioactive wastes generated during electro-metallurgical treatment of spent nuclear fuel. These waste forms must be qualified to meet the regulatory requirements on radionuclide release and thermal performance within a geologic repository. Acceptable limits on temperature and radionuclide release must also be met under on-site interim storage and transportation conditions. The qualification relies on both testing and modeling.
- Developing models of the long-term degradation behavior and radionuclide release mechanisms of metallic and ceramic waste forms described above. This modeling effort focuses on mechanistic interpretation of experimental results of waste qualification tests provided by the waste form development and laboratory testing with the objective of applying these results to the long time scales and environmental conditions of interest in repository performance evaluation.
- Creating and maintaining an electronic database of metal and ceramic waste performance data generated by experimental groups and analysts. Among other benefits, this database will serve to support retention and ready access to vast amounts of institutional knowledge accumulated over many years in waste form design, optimization, and performance modeling. Access to this database by project personnel will ultimately be via World Wide Web technologies.



Thermal Analysis Results that Demonstrate the Potential Increase in the Amount of Recycle Waste that Could Be Disposed as Compared to Direct Disposal of Spent Nuclear Fuel

- Developing a repository performance assessment model to be used for scoping studies and parameter sensitivity studies. This model is used to perform preliminary repository performance evaluations to support decisions related to strategies regarding the recycling of spent fuel.
- Developing scoping-level thermal models to evaluate the repository thermal response that would result from removing key radionuclides from the waste stream. These models are used to evaluate the benefits that could be achieved with regard to: amounts of waste that could be emplaced in a given repository, alternative repository design options, and strategic decisions related to the recycling of spent fuel.
- The benefits of recycling spent nuclear fuel as proposed under the GNEP presents an opportunity to re-think the waste management and disposal strategy in both the U.S. and internationally. NE researchers are participating in the development and implementation of an Integrated Waste Management Strategy for the GNEP.
- Developing sub-models for the waste management and disposal for inclusion in system analysis modeling tools.
- Supporting the development of the Yucca Mountain Project's Total System Performance Assessment as part of its License Application.

For additional information, please visit
<http://www.ne.anl.gov>
or contact Mark Nutt at wnutt@anl.gov.