Sandia National Laboratories

Geoscience and Environment Center

Focus

The Geoscience and Environment Center provides a broad and integrated set of capabilities that are focused on improved understanding of the subsurface and on development of technology for specific applications. Present activities include basic research, applied research, and technology development for: remediation of sites having contaminated soils and groundwater; disposal of radioactive waste in underground repositories; transportation of nuclear and hazardous materials; storage of strategic reserves of petroleum and other hydrocarbons in man-made caverns; recovery of oil and gas from geologic reservoirs; and support of defense-related activities. A major responsibility of the Center is to carry out the remediation of Sandia's contaminated sites under the provisions of RCRA.

Our primary programmatic responsibility is to initiate and manage Sandia's environmental programs, and in this role we serve as principal contact with the Department of Energy's (DOE) Office of Environmental Management. We are leading Sandia's newest environmental initiative in Water Safety, Security, and Sustainability. Together with the Energy and Transportation Security Center, we are responsible for initiating and managing technology development projects to assist the natural gas and oil industry. Finally, we oversee Sandia's Geoscience Research sponsored by DOE's Office of Basic Energy Sciences. We carry out this suite of programmatic responsibilities in partnership with a broad variety of organizations, including the Nuclear Regulatory Agency, the Department of Defense, the Department of Interior, international entities, industry, and universities.

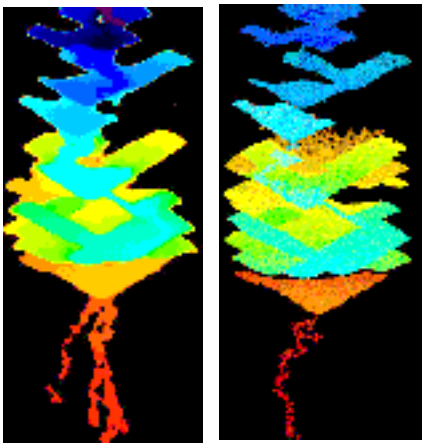
Thermo-Mechanical Drift at Yucca Mountain

The Center is staffed by more than 100 technical employees, supported by a blend of administrative personnel. We have an active program for post-doctoral fellows, students, and visiting industry associates. Our permanent facilities are sited in Albuquerque, New Mexico, but we carry out field experiments wherever required.

Lines of Business

- Developing and applying methods for subsurface characterization to improve understanding of:
  - Soil and rock-mass structure and properties
  - Fluid flow and fluid rock interactions in geologic media
  - Contaminants fate and migration

  Two particular emphases are subsurface sensor technology, and numerical methods for characterizing the subsurface
- Developing and applying methods for analysis and improvement of *in situ* processes, related to:
  - Subsurface barriers
  - Removal or stabilization of hazardous species in soil, rock, or groundwater
  - Leaching of underground caverns in salt
  - Stabilization of underground facilities such as mines, waste repositories, and storage caverns
  - Reservoir stimulation, production, and management
- Remediation of contaminated sites at Sandia under the provisions of RCRA

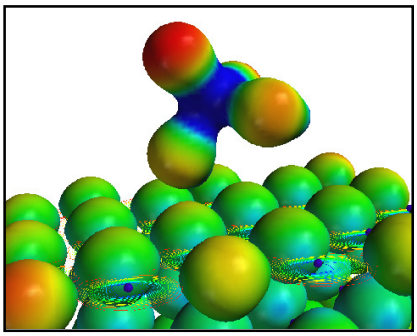


Chlorinated Solvent Migration in Heterogeneous Media Experiment [left] - Simulation [right]

Sandia is a multiprogram laboratory operated by Sandia corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.

Sandia National Laboratories

- Developing technology and supporting customers to achieve safe, efficient, and economical transportation of nuclear and hazardous materials
- Basic and Exploratory Geoscience research that directs and enhances our subsurface characterization and *in situ* process improvement lines of business. This research encompasses:
  - Geochemistry
  - Geohydrology
  - Geomechanics
  - Geophysics



Quantum Mechanical Simulation of Arsenic Sorption on Oxide Surface

Capabilities and Facilities

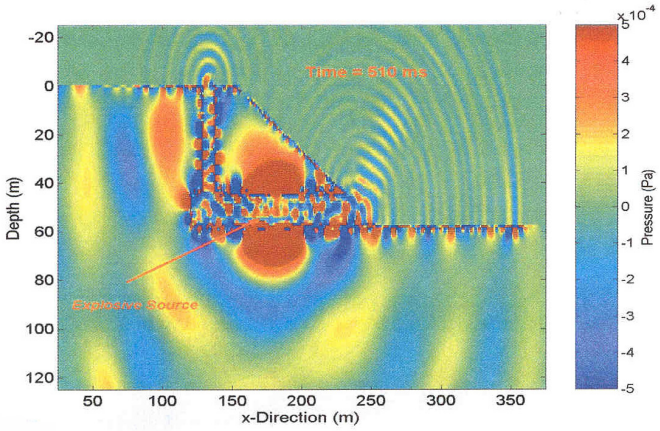
We have a number of strong capabilities and facilities used in conjunction with strengths of other Sandia centers and non-Sandia partners to meet programmatic goals. Significant capabilities and facilities include:

- Laboratory and large-scale field testing
- Rock mechanics lab
- Instrumentation development
- Flow visualization lab
- Code development and modeling
- Molecular modeling lab
- Ability to manage major projects
- RCRA Site Remediation Management

Aerial View of Chemical Waste Landfill

TRUPACT II Cask Certification Testing

Processed Acoustic Image of a Leached Storage Cavern



Seismic and Acoustic Pressure Waves from Explosive Source

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