

The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) is a U.S. Department of Energy (DOE) national scientific user facility. EMSL is the centerpiece of DOE's commitment to provide world-class research capabilities for enabling fundamental research on the physical, chemical, and biological processes that underpin critical scientific issues.

EMSL capabilities are used to address the fundamental science that will be the basis for finding solutions to national environmental issues such as cleaning up contaminated areas at DOE sites across the country and developing "green" technologies to reduce or eliminate future pollution production. The capabilities also are used to further our understanding of global climate change, environmental issues relevant to energy production and use, and health effects resulting from exposure to contaminated environments.

If you are interested in collaborating with our scientists or using the facility's resources, more information and specific procedures for becoming an EMSL user can be found at <http://www.emsl.pnl.gov>.

Contacts

Access to this laboratory is granted based on a peer-review proposal system. Scientists are welcome to submit proposals of research using an online form at <http://www.emsl.pnl.gov>.

For details about the resources in the EMSL Environmental Spectroscopy & Biogeochemistry Facility, collaborative opportunities, or information on how to become a user, please contact:

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Subsurface Flow & Transport Experimental Laboratory



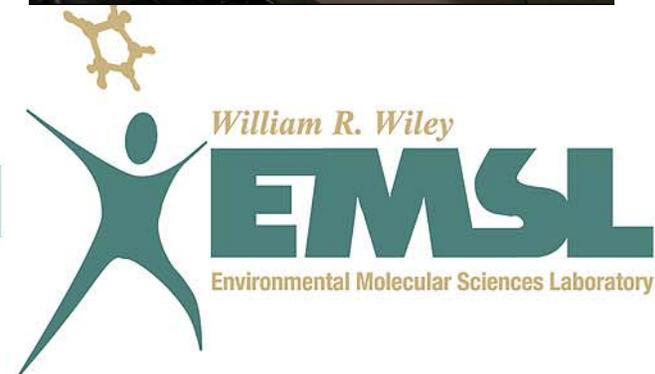
www.emsl.pnl.gov

The W.R. Wiley Environmental Molecular Sciences Laboratory (EMSL) is a U.S. Department of Energy (DOE) national scientific user facility located at Pacific Northwest National Laboratory (PNNL) in Richland, Washington. EMSL is operated by PNNL for the DOE Office of Biological and Environmental Research.

Pacific Northwest
National Laboratory
Operated by Battelle for the
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Subsurface Flow & Transport Experimental Laboratory

The Subsurface Flow & Transport Experimental Laboratory (SFTEL) is part of the Environmental Spectroscopy & Biogeochemistry (ES&B) Facility at the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL), a national user facility. EMSL is the cornerstone of the U.S. Department of Energy's commitment to provide high-quality capabilities for enabling fundamental research on the physical, chemical, and biological processes. A more thorough understanding of these processes lays the foundation for new solutions to environmental problems.

ES&B Facility scientists focus on environmental molecular science and the application of fundamental physical chemistry concepts to the study of chemical reactions in heterogeneous natural material, with an emphasis on soil and subsurface systems. Capabilities are available for materials characterization, aqueous-phase and solid-phase speciation and reaction/kinetic measurements, analytical environmental chemistry, modeling of molecular and thermodynamic geochemical processes, and intermediate-scale flow and transport studies.

The main focus of the SFTEL is on intermediate-scale experimentation. The laboratory offers several meter-scale flow cells and columns for research in saturated and unsaturated porous media. Some of the flow cells and columns can be used in conjunction with a dual-energy gamma radiation system. The SFTEL also offers a fully automated saturation-pressure apparatus. The SFTEL enjoys full analytical and computational support. Samples collected from experiments can be analyzed within

the EMSL facility. Computational support is made available for experimental design and data analysis.

State-of-the-Art Equipment. The laboratory is equipped with a fully automated, dual-energy gamma radiation system. The apparatus can be used to simultaneously and nondestructively determine:

- Saturation of two immiscible fluids (water/NAPL; water/air; NAPL/air)
- Bulk density and water content
- Water content and salt concentration

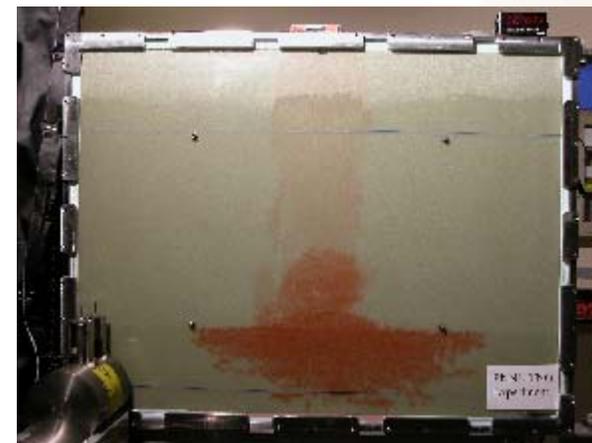
A fully automated saturation-fluid pressure apparatus also exists and can be used to determine constitutive relations of two- and three-phase fluid systems in porous media.

Analytical Support. The SFTEL has a full analytical laboratory to provide chemical analysis support. The instruments available for support of flow and transport research include an inductively coupled plasma mass spectrometer, gas chromatograph-mass spectrometer, liquid chromatograph, ion chromatograph, capillary electrophoresis, and a total organic carbon analyzer.



Scientific Facilities are available to design experiments

and to compare experimental results with numerical predictions. An example of the available software is the STOMP (Subsurface Transport Over Multiple Phases) simulator; www.pnl.gov/etd/stomp.



Flow cell experiment investigating both the behavior of a viscous, multicomponent non-aqueous phase liquids (red color) in a fluctuating water table system, and its subsequent dissolution.

EMSL is a national scientific user facility and research organization. A comprehensive array of leading-edge resources, including the SFTEL, are available on a peer-reviewed proposal basis. Approved access to the SFTEL is available at no cost to researchers from around the world who plan to share their results in the open literature. Users are responsible for costs related to travel and lodging. Visitors have the option of staying at the User Housing Facility (<http://www.pnl.gov/uhf/>) on the campus of the Pacific Northwest National Laboratory (PNNL).