

**BARRY M. FREIFELD**  
**Lawrence Berkeley National Laboratory**  
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**Education:**

Ph.D. Civil and Environmental Engineering, 2001, University of California, Berkeley  
M.S. Mechanical Engineering, 1992, University of California, Santa Barbara  
B.A. Applied Mathematics 1989, University of California, Berkeley

**Work Experience:**

**Mechanical Engineer, Lawrence Berkeley National Laboratory**, Sept. 1998 - Present  
Staff Research Associate, Sept.1997 – August 1998  
Principal Research Associate, March 1995 - August 1997  
Senior Research Associate, April 1992 - February 1995

**Current Research Areas:**

At Lawrence Berkeley National Laboratory my recent research has focused on: (1) geological sequestration of CO<sub>2</sub>, particularly field demonstrations in saline and depleted gas aquifers (2) understanding thermal and hydrologic conditions in arctic regions and (3) development of fiber-optic DTS techniques for monitoring subsurface processes. Currently I am the Principal Investigator for collaborations supporting two international carbon storage demonstration projects: the Otway Project in Victoria, Australia and the EU funded CO<sub>2</sub>SINK program in Ketzin, Germany.

**Selected Journal Publications:**

Freifeld, B. M., 2009, The U-tube: a new paradigm in borehole fluid sampling, *Scientific Drilling*, 8, doi:10.2204/iodp.sd.8.07.2009

Freifeld, B. M., Finsterle, S., Onstott, T. C., Toole P., and Pratt, L. M., 2008, Ground surface temperature reconstructions: using in situ estimates for thermal conductivity acquired with a fiber-optic distributed thermal perturbation sensor, *Geophys. Res. Lett.* 35, L14309, doi:10.1029/2008GL034762, LBNL-1755E .

Rutqvist J., B. Freifeld, K.-B. Min, D. Elsworth, and Y. Tsang, 2008, Analysis of thermally induced changes in fractured rock permeability during 8 years of heating and cooling at the Yucca Mountain Drift Scale Test. *Int J Rock Mech Mining Sci*, doi:10.1016/j.ijrmms.2008.01.016.

Doughty, C., B. M. Freifeld, and R. C. Trautz, 2008, Site characterization for CO<sub>2</sub> geologic storage and vice versa: the Frio brine pilot, Texas, USA as a case study, *Environ Geol* 54:1635–1656, doi:10.1007/s00254-007-0942-0.

Kneafsey, T.J., L. Tomutsa, G.J. Moridis, Y. Seol, B.M. Freifeld, C.E. Taylor and A. Gupta, 2007, Methane hydrate formation and dissociation in a partially saturated core-scale sand sample, *Journal of Petroleum Science and Engineering* 56, pp. 108–126

Freifeld, B. M. & Trautz, R. C., 2006, Real-time quadrupole mass spectrometer analysis of gas in borehole fluid samples acquired using the U-tube sampling methodology. *Geofluids* 6 (3), 217-224. doi: 10.1111/j.1468-8123.2006.00138.x

Su, G.W., Freifeld, B.M., Oldenburg, C.M., Jordan, P.D. & Daley, P.F. , 2006, Interpreting velocities from heat-based flow sensors by numerical simulation, *Ground Water*, 44 (3), 386-393. doi: 10.1111/j.1745-6584.2005.00147.x

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Hovorka, S.D., Benson, S.M., Doughty, C., Freifeld, B.M., Sakurai, S., Daley, T.M., Kharaka, Y.K., Holtz, M.H., Trautz, R.C., Nance, H.S., Myer, L.R., and Knauss, K.G., 2006, Measuring permanence of CO<sub>2</sub> storage in saline formations -the Frio experiment: *Environmental Geosciences*, v. 13, p. 105-121.

Kharaka Y.K., Cole D.R., Hovorka S.D., Gunter W.D., Knauss K.G., and Freifeld, B.M. (2006) Gas-water-rock interactions in Frio Formation following CO<sub>2</sub> injection: Implications for the storage of greenhouse gases in sedimentary basins. *Geology*: Vol. 34, No. 7 pp. 577–580.

Freifeld, B.M.; Kneafsey, T.J., and Rack, F., 2006, "On-Site Geologic Core Analysis Using a Portable X-ray Computed Tomographic System," From: Rothwell, R.G., 2006, *New Techniques in Sediment Core Analysis*. Geological Society, London, Special Publications, 267, 165–178. 0305-8719/06/, The Geological Society of London.

Freifeld, B.M., Trautz, R.C., Yousif K.K., Phelps, T.J., Myer, L.R., Hovorka, S.D., and Collins, D., 2005, The U-Tube: A novel system for acquiring borehole fluid samples from a deep geologic CO<sub>2</sub> sequestration experiment, *J. Geophys. Res.*, 110, B10203, doi:10.1029/2005JB003735.

Cook, P. J., Salve, R., Freifeld, B. M. and Tsang, Y. T., 2003, A measurement system for systematic hydrological characterization of unsaturated fractured welded tuff in a mined underground tunnel. *Ground Water* (41) 4.

Freifeld, B. M. and C.M.Oldenbergh, 2000, The restricted interval Guelph permeameter: theory and application, *Water Resources Research*, 36 (6) 1373–1380.

**Patents and Inventions:**

**U-Tube Sampling System**—Developed a deep-well sampling methodology for collecting and analyzing fluids maintained at *in situ* conditions. Techniques for handling multiphase fluid collected at high frequency permit characterization of tracer elution curves for multi-well transport studies. Currently in use or proposed for use in numerous locations in N. America, Greenland, Australia, and Europe.

**Portable X-ray Core Imager (US Patent 7082185)**—A transportable x-ray core imaging system with a novel shielding arrangement that provides for a cabinet-safe system. Using an optimized compensator system enhanced dynamic range while imaging cylindrical objects using the cone-beam geometry is obtained.

**Dissertation:**

Freifeld, B.M., Estimation of Fracture Porosity in an unsaturated fractured welded tuff using gas tracer test, Ph.D. dissertation, U.C. Berkeley, Fall 2001

**Awards:**

2006 LBNL Outstanding Performance Award— Methane Hydrate Research Team  
2006 LBNL Outstanding Performance Award— Frio Brine Pilot Research Team  
2004 LBNL Outstanding Performance Award— Transuranic Waste Shipment Team  
2003 LBNL Outstanding Performance Award— Engineering Task Force  
1998 LBNL Outstanding Performance Award—Contributions to Yucca Mountain Project Field Studies