

BRIAN J. O. L. MCPHERSON

University of Utah
Salt Lake City, Utah 84112

Office Phone: 801.581.5634

Home Phone: 801.558.4043

Email: b.j.mcpherson@utah.edu

Websites: <http://www.civil.utah.edu/faculty/mcpherson/index.shtml>

<http://southwestcarbonpartnership.org>

<http://CO2.civil.utah.edu>

EDUCATION

Ph.D. in Geophysics, 1996, University of Utah, Salt Lake City.

Dissertation: *Three-Dimensional Model of the Geologic and Hydrodynamic History of the Uinta Basin, Utah: Analysis of Overpressures and Oil Migration.*

Advisors: David S. Chapman (University of Utah) and John D. Bredehoeft (USGS)

M.S. in Geophysics, 1992, University of Utah, Salt Lake City,

Thesis: *Geothermal Analysis of the Powder River Basin, Wyoming*

Advisor: David S. Chapman

B.S. in Geophysics, 1989, University of Oklahoma, Norman

Senior Thesis: *Annealing of etchable fission-track damage in F-, OH-, Cl- and Sr-apatite*

Advisor: Kevin D. Crowley

PROFESSIONAL RESEARCH INTERESTS AND EXPERTISE

Dr. McPherson is an Associate Professor of Civil and Environmental Engineering at the University of Utah. Since 1997, Dr. McPherson has conducted carbon management and engineering research, especially geological sequestration studies, but including other modes of carbon management as well, such as biomimetic and other approaches. Technical focus areas include groundwater and reservoir simulation, multiphase flow analysis and simulation, rock deformation, and subsurface chemically reactive transport analysis and simulation. McPherson and his research group maintain a high pressure/high temperature laboratory capable of combined multiphase flow and rock mechanical response experimentation, and are currently conducting flow tests to quantify diagenetic changes on rocks during CO₂ sequestration. Other research that Dr. McPherson continues to pursue includes coupled heat and fluid processes in sedimentary basins and geothermal systems, and petroleum generation and migration processes.

PROFESSIONAL EXPERIENCE

Associate Professor of Civil and Environmental Engineering, *August, 2006 - Present*, Department of Civil and Environmental Engineering, University of Utah (position endowed by USTAR, the Utah Science, Technology and Research initiative).

Associate Professor of Hydrology, *2002 - 2006*, New Mexico Institute of Mining and Technology

Senior Scientist, *2000 - Present*, New Mexico Tech Petroleum Recovery Research Center (still employed in part-time joint position with New Mexico Tech).

Assistant Professor of Hydrology, *1996 – 2001*, New Mexico Institute of Mining and Technology

Research Hydrologist, *1996 - 2006*, Geophysical Research Center, New Mexico Institute of Mining and Technology

Postdoctoral Fellow, *1996*, The Johns Hopkins University, Baltimore, MD. Postdoctoral Advisor: Grant Garven

Hydrologist, GRADE GS-11, *1992 – 1995*, U.S. Geological Survey, Menlo Park, California.

Research Geophysicist Intern, *1991*, Reservoir Modeling Group, Exxon Production Research Company, Houston, Texas.

Research Geophysicist Intern, *1990*, Basin Analysis Group, Exxon Production Research Company, Houston, Texas.

Geotech, Geothermal Analysis, Utah Geological and Mineral Survey, *1988 - 1990*.

LEADERSHIP ACTIVITIES AND PROJECT MANAGEMENT

Dr. McPherson is Director of the Southwest Regional Partnership on Carbon Sequestration. Dr. McPherson formed the Southwest Partnership project in 2003, one of seven regional partnerships funded by the U.S. Department of Energy to evaluate the science and technology of storage of atmospheric carbon in underground geological formations and in surface soil and vegetation. The project was selected by the Department of Energy's National Energy Technology Laboratory (NETL) to proceed with a deployment phase, which will involve injection of at least 1,000,000 tons of CO₂ into a deep geological formation. The purpose of the deployment phase is to assess the efficacy of large-scale geological CO₂ storage, and to evaluate this as an approach for reduction of greenhouse gases in the atmosphere. More information about the project is accessible at <http://southwestcarbonpartnership.org> and <http://CO2.civil.utah.edu>.

In addition to managing these carbon sequestration programs and other research programs, another relevant recent management role includes leading earth science activities associated with the National Science Foundation's effort to create a new Deep Underground Science and Engineering Laboratory (DUSEL), chairing a set of working committees comprising over 25 organizations and over 100

personnel; information available at <http://www.earthlab.org>. Upon taking leadership of the Southwest Partnership, Dr. McPherson resigned his role as chair of the Earthlab effort.

FUNDED RESEARCH PROJECTS: B.J. McPherson, Associate Professor

Total Career Funding: \$123,382,896

Total Current Funding (2010-2011 active grants): \$10,930,685

PI, Development of Chemical Model to Predict the Interactions between Supercritical CO₂ and Fluid, Rocks in EGS Reservoirs, U.S. Department of Energy, **01/29/2010 - 03/31/2013**.

Total project funding: \$944,707. Status: *Awarded*.

PI, EXPANDED SITE CHAR GEO FORMATIONS CO₂, U.S. Department of Energy, **08/30/2010 - 09/29/2012**. Total project funding: \$5,000,000.00. Status: *Awarded*.

PI, SITE CHAR GEO FORMATIONS CO₂, U.S. Department of Energy, **09/30/2009 - 09/29/2012**. Total project funding: \$3,796,000. Status: *Awarded*.

PI, ARRA-MID-CONTINENT CARBON, U.S. Department of Energy, 09/30/2009 - 09/29/2010. Total project funding: \$2,696,556.00. Status: *Awarded and completed*.

PI, EPA STAR PROGRAM. US ENVIRONMENTAL PROTECTION AGENCY, **07/01/2009 - 06/30/2012**. Total project funding: \$899,567.00. Status: *Awarded*.

CO-PI, RISK ASSESSMENT, U.S. Department of Energy, **10/01/2009 - 09/30/2012**. Total project funding: \$290,411.00. Status: *Awarded*.

CO-PI, ARRA-REG SEQ TECH TRAINING, U.S. Department of Energy, **09/30/2009 - 09/29/2012**. Total project funding: \$330,364.00. Status: *Awarded*.

PI, Field-Testing of Geologic CO₂ Sequestration in Deep Saline Formations: \$20,400,000(July, 2008 – September, 2016): Southern California Edison, an Edison International Company. Status: *Awarded, but stop-work order in place*.

PI, Field Validation of Carbon Sequestration: Southwest Regional Partnership on Carbon Sequestration, Phase II, \$66,972,330 (**October, 2007 – September, 2017**): U.S. Department of Energy. Status: *Awarded and project is underway*.

PI, Field Validation of Carbon Sequestration: Southwest Regional Partnership on Carbon Sequestration, Phase II, \$19,083,627 (October, 2005 – September, 2009): U.S. Department of Energy. Status: *completed*.

PI, Evaluation of Carbon Sequestration Technology Options – Southwest Regional Partnership on Carbon Sequestration, Phase I, \$2,100,000 (October, 2003 – December, 2005): U.S. Department of Energy. Status: *completed*.

PI, CO₂ Sequestration in Depleted Gas Reservoirs: Quantification of Fundamental Chemical and Mechanical Processes Affecting Flow and Injectivity, \$250,000 (January 2003 - January 2005): Gas Technology Institute/RPSEA. *Status: completed.*

PI, Phase 2 Experimental and Modeling Analysis of Sandstone Aquifer Changes Associated With Geologic CO₂ Sequestration, \$25,000 (January, 2004 - December, 2004): Institute of Geophysics and Planetary Physics (IGPP) of Los Alamos National Laboratory. *Status: completed.*

PI, Underground Hydrogeologic and Geophysical Research, \$28,000 (September, 2002 - September, 2003): National Science Foundation. *Status: completed.*

PI, Experimental and Modeling Analysis of Sandstone Aquifer Changes Associated With Geologic CO₂ Sequestration, \$25,000 (October, 2002 - September, 2003): Institute of Geophysics and Planetary Physics (IGPP) of Los Alamos National Laboratory. *Status: completed.*

Co-investigator (with PI Gillian Bond), CO₂ Capture and Sequestration by a Biomimetic Route Based on Enzymatic Catalysis, \$42,000 (January, 2003 – December, 2004): Electric Power Research Institute (EPRI). *Status: completed.*

PI, CO₂ Flow Simulation and Characterization, \$31,000 (September, 2001 – August, 2003): Alberta Energy and Utilities Board. *Status: completed.*

PI, Acquisition of Computer Workstations for Hydrogeologic and Geophysical Research, \$203,334 (August, 1998 - September, 2001): National Science Foundation. *Status: completed.*

PI, Understanding Fracturing in the Midland Basin, Phase 2: Basin Evolution Modeling with In Situ Fracture Genesis via an Embedded Distinct Element Model, \$35,000 (October 1, 1998 - September 30, 1999): Sandia National Laboratories (SURP). *Status: completed.*

PI, Understanding the Hydrogeology of the San Bernardino Basin, Arizona, \$180,000 (September, 1997 - September, 2001): U.S. Fish and Wildlife Service. *Status: completed.*

PI, Understanding Fracturing in the Midland Basin, Texas: The Roles of Hydrodynamics and Tectonic Stresses, \$35,000 (October 1, 1997 - September 30, 1998): Sandia National Laboratories (SURP). *Status: completed.*

Co-Investigator (with PI Fred Phillips), Hydrogeologic Characterization of the Rattlesnake Springs Area, Carlsbad, New Mexico, \$15,000 (1997): National Park Service. *Status: completed.*

OTHER PROPOSAL EFFORTS (unfunded)

PI, AZURE SKIES, U.S. Department of Energy, 05/01/2010 - 10/31/2014. Total project funding: \$5,069,075.00. *Status: Not Awarded.*

PI, DIRECT FUEL CELL CARBON SEQ, U.S. Department of Energy, 04/01/2010 - 09/30/2017. Total project funding: \$8,468,212.00. Status: *Not Awarded*.

PI, CCPI – GREEN RIVER REGIONAL SEQUESTRATION DEPLOYMENT, Southern California Edison, 04/01/2010 - 09/30/2015. Total project funding: \$39,599,083.00. Status: *Not Awarded*.

PI, CLEAN COAL POWER INITIATIVE – SAN RAFAEL SWELL REGIONAL SEQUESTRATION DEPLOYMENT, U.S. Department of Energy, 10/01/2009 - 09/30/2019. Total project funding: \$157,629,821.00. Status: *Not Awarded*.

CO-PI, DEV STORAGE OF CARBON DIOXIDE. HAN,WEON SHIK(PI). U.S. Department of Energy, 09/30/2009 - 09/29/2013. Total project funding: \$1,176,850.00. Status: *Not Awarded*.

CO-PI, ARRA-PLEASANT BAYOU GEOPRESSUR, U.S. Department of Energy, 09/30/2009 - 09/29/2010. Total project funding: \$153,796.00. Status: *Not Awarded*.

Co-PI, Integrity of Carbon Dioxide Storage in Faulted/Fractured Geologic Formations, \$78,000 (submitted 2005): U.S. Department of Energy

PI, Assessment and Comparison of MMV Options for Geologic CO₂ Sequestration, \$782,600 (submitted 2004): U.S. Department of Energy.

PI, Geologic/EOR CO₂ Sequestration: Optimizing Injection and Minimizing Its Risks, \$615,000 (submitted 2003): U.S. Department of Energy.

PI, Investigation of Physical Mechanisms Controlling Proppant Flowback in Hydraulic Fractures, \$1,250,000 (submitted 2002): U.S. Department of Energy.

PI, Hydrogeologic CO₂ Sequestration: Integrated Research and Pedagogy, \$330,000 (submitted 2002): National Science Foundation.

Co-PI, Optimization of Pretreatment Process for Desalination of Oilfield Brines, \$1,628,000 (submitted 2002): U.S. Department of Energy.

Co-PI, Fracture Initiation and Propagation in a Fully Coupled, Discrete Hydro-Mechanical System, \$124,339 (Submitted 2002): National Science Foundation.

Co-PI, Thermal Evolution of the Denver Basin, \$123,700 (submitted 2001): National Science Foundation.

PI, Integrating Scientific Research with Undergraduate Science Teaching and Collaborative Curriculum Development: A Software Approach, \$74,912 (submitted 2001): National Science Foundation.

Co-PI, Geoscience Research Intensive Program (GRIP): A Track to Create Sustained Scientific Studies and Career Opportunities for Underrepresented Groups, \$1,177,737 (submitted 2001): National Science Foundation.

Co-PI, Enhancing Stimulation for Commingled Low-permeability Natural Gas Reservoirs, \$835,212 (submitted 2001): U.S. Department of Energy.

PI, Improvement of Hydraulic Fracture Proppant Treatments in Low-Permeability Gas Formations, \$788,861 (submitted 2001): U.S. Department of Energy.

PI, CAREER: Effective Stress for Permeability at High Fluid Pressures and Large Pressure Changes, \$571,565 (submitted 2000): National Science Foundation.

PI, Long Term Effects of CO₂ Injection on Aquifers and Sealing Formations, \$1,708,962 (submitted 2000): U.S. Department of Energy.

PI, Extended Effective Stress Relationships for Deformation, \$294,471 (submitted 2000): National Science Foundation.

PI, CO₂ Sequestration in Regional Scale Aquifers, \$137,147 (submitted 1999): U.S. Department of Energy.

PI, CAREER: Integrated Research and Pedagogy in a Study of CO₂ Sequestration in Aquifers, \$311,288 (submitted 1999): National Science Foundation.

PI, The Role of Hydrodynamics in Fracture Genesis, \$188,000 (submitted 1998): National Science Foundation.

PI, Impact of Faults on Regional Scale Flow and Transport, \$50,000 (submitted 1998): New Mexico Water Resources Research Institute.

PI, The Role of Hydrodynamics in Fault and Fracture Genesis, \$182,000 (submitted 1997): National Science Foundation.

PI, Fracture Generation: Relative Roles of Formation Flexure and Fluid Pressures, \$20,000 (submitted 1997): Petroleum Research Fund (ACS).

PI, Transforms Between Geophysical Properties and Hydrological Properties, \$25,000 (submitted 1997): New Mexico Water Resources Research Institute.

PUBLICATIONS

All publications are listed chronologically.

Book and Book Chapters

5. *McPherson, Brian J.*, 2010, Carbon Capture and Storage, book chapter in *McGraw-Hill Yearbook of Science and Technology*, 2010, McGraw-Hill, New York, 496 pp.
4. *McPherson, B.*, 2010, Development and application of carbon dioxide (CO₂) storage for improving the environmental impact of advanced power plants, book chapter in *Advanced Power Plant Materials, Design and Technology*, D. Roddy, Editor, Woodhead

Publishing, Cambridge, UK, 382 pp.

3. *McPherson, B.J.*, **2009**, The Science and Technology of Geologic Carbon Sequestration: Future Research Needs, Final Chapter in *Carbon Sequestration and Its Role in the Global Carbon Cycle*. B. McPherson, and E. Sundquist, Eds., Geophysical Monograph Series, Volume 183, American Geophysical Union, Washington, D.C., doi: 10.1029/2009gm01308.
2. Han, W. S., *McPherson, B.J.*, **2009**, On using numerical simulation to evaluate CO₂ flow and transport in the subsurface: Uncertainty due to choice of Equations of State algorithms, Chapter in *Carbon Sequestration and Its Role in the Global Carbon Cycle*. B. McPherson, and E. Sundquist, Eds., Geophysical Monograph Series, Volume 183, American Geophysical Union, Washington, D.C., doi:10.1029/2009gm01308.
1. *McPherson, B. J. O. L.* and Sundquist, E. T., **2009**, editors, *Carbon Sequestration and its Role in the Global Carbon Cycle*, AGU Monograph Series, Publisher: American Geophysical Union, Washington, D.C., doi:10.1029/2009gm01308.

Journal Articles and Peer-Reviewed Published Professional Reports

32. *McPherson, B. J. (chair)*, P. McGrail, S. Frailey, J. Sminchak, S. Wade, C. Gorecki, K. Sams, and C. Doughty, **2010**, Best Practices Manual of Risk Analysis and Simulation for Geologic Storage of CO₂, National Energy Technology Laboratory, Report DOE/NETL-2011/1459, 110 pp.
31. Han, Weon Shik, *McPherson, B.J.*, P.C. Lichtner, Wang, F.P., **2010**, Evaluation of CO₂ trapping mechanisms at the SACROC northern platform, Permian basin, Texas, site of 35 years of CO₂ injection. *American Journal of Science*, 310, 282-324, doi: 10.2745/04.2010.03.
30. Han, Weon Shik, Stillman, G., Lu, M., Lu, C., *McPherson, B.*, Park, E., **2010**, Evaluation of potential non-isothermal effect and heat transport during CO₂ sequestration. *Journal of Geophysical Research-Solid Earth* doi:10.1029/2009jb006745.
29. Han, Weon Shik, Lee, S.-Y., Lu, C. *McPherson B.J.*, **2010**, Effect of permeability on CO₂ trapping mechanisms and buoyancy-driven CO₂ migration in saline formations. *Water Resources Research* doi:10.1029/2009wr007850.
28. Han, Weon Shik, Kim K.-Y., Lu M., *McPherson, B.J.*, **2010**. Injectivity changes and associated temperature disequilibrium study: numerical study. *Energy Procedia 10th International Conference on Greenhouse Gas Technology*, 19-23 September 2010, RAI, Amsterdam, Netherlands.
27. Lu, C., Han, W. S., Lee, S.-Y., *McPherson, B. J.*, Lichtner, P.C. **2009**, Effects of density and mutual solubility of CO₂-brine system on CO₂ storage in geologic formations:

- “Warm” vs. “Cold” Formations. *Advances in Water Resources*, Vol.32, No.12, 1685-1702, doi:10.1016/j.advwatres.2009.07.008.
26. Han, W. S., *McPherson, B.J.*, **2009**, Optimizing geologic CO₂ sequestration by injection in deep saline formations below oil reservoirs. *Energy Conversion and Management*, Vol. 50, No.10, 2570-2582, doi:10.1016/j.enconman.2009.06.008.
25. Lu, C., Lee, S.-Y., Han, W. S., *McPherson, B.J.*, Lichtner, P.C., **2009**, Comments on “Abrupt-interface solution for carbon dioxide injection into porous media” by M. Dentz and D. Tartakovsky. *Transport in Porous Media*, Vol.79, No.1, 29-37 doi:10.1007/s11242-009-9362-9.
24. Weon Shik Han and *Brian J. McPherson*, **2008**, Comparison of Two Different Equations of State for Application of Carbon Dioxide Sequestration, *Advances in Water Resources*, v. 31, p. 877–890, <http://dx.doi.org/10.1016/j.advwatres.2008.01.011>.
23. Sam Earman, *Brian J.O.L. McPherson*, Fred M. Phillips, Steve Ralser, James M. Herrin, James Broska, **2008**, Tectonic Influences on Ground Water Quality: Insight from Complementary Methods, *Ground Water*, Vol. 46, No. 3, p. 354–371, <http://dx.doi.org/10.1111/j.1745-6584.2007.00402.x>
22. *Brian J.O.L. McPherson*, Weon Shik Han and Barret S. Cole, **2008**, Two equations of state assembled for basic analysis of multiphase CO₂ flow and in deep sedimentary basin conditions, *Computers & Geosciences*, v. 34, p. 427–444, <http://dx.doi.org/10.1016/j.cageo.2007.05.017>.
21. Li, L., N. Liu, *B.J. McPherson*, and R. Lee, **2008**, Influence of Counter Ions on the Reverse Osmosis Permeation of NaCl Solution through MFI Zeolite Membranes, *Desalination*, Volume 228, Issues 1-3, Pages 217-225. <http://dx.doi.org/10.1016/j.desal.2007.10.010>.
20. Liu, N., L. Li, *B.J. McPherson*, and R. Lee, **2008**, Removal of organics from produced water by reverse osmosis using MFI-type zeolite membranes, *Journal of Membrane Science*, Volume 325, Issue 1, p. 357-361, ISSN 0376-7388, <http://dx.doi.org/10.1016/j.memsci.2008.07.056>.
19. *B.J. McPherson* and D.F. Boutt, **2007**, Analysis of the role of fluids in causing fractures in the Spraberry Trend, Midland Basin, *Geofluids*, v. 7, p. 415–426, doi: 10.1111/j.1468-8123.2007.00195.x
18. L. Li, N. Liu, *B.J. McPherson*, and R. Lee, **2007**, “Enhanced Water Permeation of Reverse Osmosis through MFI-type Zeolite Membranes with high Aluminum Contents,” *Industrial & Engineering Chemistry Research*, 46, 1584-1589.
17. David F. Boutt, Benjamin K. Cook, *Brian J. O. L. McPherson*, and J. R. Williams, **2007**, Direct simulation of fluid-solid mechanics in porous media using the discrete element and lattice-Boltzmann methods, *JOURNAL OF GEOPHYSICAL RESEARCH*, VOL. 112, B10209, doi:10.1029/2004JB003213.

16. Earman, S., Phillips, F. M., and McPherson, B. J. O. L., **2005**. The role of “excess” CO₂ in the formation of trona deposits, *Applied Geochemistry* v. 20(12), p. 2217-2232; doi: 10.1016/j.apgeochem.2005.08.007.
15. McPherson, B. J., Lee, R., and Romero, V., **2004**: CO₂ Sequestration and Enhanced Gas Recovery in Depleted Gas Reservoirs: Quantification of Fundamental Chemical and Mechanical Processes Affecting Flow and Injectivity – Gas Technology Institute Published Report GRI-04/0177-RPSEA-0005-04, 157 pp.
14. Wellman, T. P., McPherson, B. J., Grigg, R.B., Svec, R. K. and Lichtner, P. C., **2003**, Evaluation of CO₂-Brine-Reservoir Rock Interaction with Laboratory Flow Tests and Reactive Transport Modeling, SPE 80228.
13. McPherson, B.J., Elsworth, D. Fairhurst, C., Kesler, S., Onstott, T.C., Roggenthen, W., Wang, H., **2003**, “EarthLab: A Subterranean Laboratory and Observatory to Study Microbial Life, Fluid Flow, and Rock Deformation,” Geosciences Professional Services, Inc., 60 pp.
12. McPherson, B., Wang, H., Kesler, S., Onstott, T., and Roggenthen, W., **2003**, Physics and Earth Science Go Underground, *GEOTIMES*, vol. 48, p. 18-22.
11. McPherson, B., **2002**, Book Review: “Introduction to Hydrogeology by D. Deming,” *HYDROGEOLOGY JOURNAL*– DOI 10.1007/s10040-002-0217-5.
10. Boutt, D. F., and McPherson, Brian J.O.L., **2002**, Simulation of sedimentary rock deformation: Lab-scale model calibration and parameterization, *Geophy. Res. Lett.*, vol. 29, no. 4, 10.1029/2001GL013987.
9. Boutt, D., and McPherson, B., **2002**, The role of particle packing in modeling rock mechanical behavior using discrete elements, ASCE Geotechnical Special Publication No. 117, *Discrete Element Methods: Numerical Modeling of Discontinua*, p. 86-98.
8. McPherson, B., **2001**, Book Review: “Groundwater in Geologic Processes by Ingebritsen, S. E. and Sanford, W. E.,” *GEOTIMES*, v. 46, no. 3, p. 35.
7. McPherson, B. J. O. L., Lichtner, P. C., Forster, C. B., Cole, B. S., **2001**, Regional-Scale Permeability by Heat Flow Calibration in the Powder River basin, Wyoming, *Geophys. Res. Lett.*, v. 28 , No. 16 , p. 3211-3214.
6. McPherson, B. J. O. L., and Bredehoeft, J. D., **2001**, Overpressures in the Uinta Basin, Utah: Analysis using a 3-D basin evolution model: *Water Resources Research*, v. 37, p. 857-871.
5. McPherson, B. J. O. L., and Cole, B. S., **2000**, Multiphase CO₂ flow, transport and sequestration in the Powder River Basin, Wyoming, U.S.A., *Journal of Geochemical Exploration*, v. 69, p. 65-69.
4. McPherson, B. J. O. L., and Garven, G, **1999**, Hydrodynamics and overpressure mechanisms in the Sacramento Basin, California: *American Journal of Science*, v. 299, p. 429-466.

3. *McPherson, B.J.O.L.*, **1998**, Book Review: "Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis by V. Batu," EOS, Transactions, American Geophysical Union, Volume 79, Number 52, p. 635.
2. *McPherson, B.J.O.L.*, and D.S. Chapman, **1996**, Thermal Analysis of the Southern Powder River Basin, Wyoming, Geophysics, v. 61, p. 1689-1701.
1. Crowley, K. D., Cameron, M., and *McPherson, B. J.*, **1990**, Annealing of etchable fission-track damage in F-, OH-, Cl- and Sr-apatite; 1, Systematics and preliminary interpretations, Nuclear Tracks and Radiation Measurements v. 17, no. 3, 409-410.

Other Reports

3. Earman, S., *McPherson, B. J. O. L.*, Phillips, F. M., Ralser, S., and Herrin, J. M., **2003**, An Investigation of the Properties of the San Bernardino Groundwater Basin, Arizona and Sonora, Mexico, New Mexico Institute of Mining and Technology Hydrology Program Report.
2. *McPherson, B.*, **2001**, "Permeability: Scale of Evaluation," report published on the CUAHSI (Consortium of Universities for the Advancement of Hydrologic Science, Incorporated) website, <http://www.cuashsi.org>, for the purpose of proposing and debating possible scientific research for CUAHSI membership.
1. *McPherson, B.*, **2001**, "Spatial and Temporal Variation of Recharge and its Relationship to other Components of the Hydrologic Cycle," report published on the CUAHSI website, <http://www.cuashsi.org>, for the purpose of proposing and debating possible scientific research for CUAHSI membership.

Peer-Reviewed Published Conference Proceedings Papers and Abstracts

67. *McPherson, B.J.*, **2010**. INVITED PLENARY PRESENTATION: Addressing A Critical Technical Aspect of Geologic Carbon Sequestration: The Reality of Microseismicity, Ninth Annual Conference on Carbon Capture & Sequestration, May 13, 2010, Pittsburgh, Pennsylvania.
66. McPherson, B.J., **2010**, INVITED PRESENTATION: Lessons Learned from Ongoing Field Tests of Geologic CO₂ Sequestration, June, 2010, American Rock Mechanics Association 44th U.S. Rock Mechanics Symposium, Salt Lake City, Utah.
65. McPherson, B.J., **2010**, INVITED PRESENTATION: Lessons Learned from Ongoing Field Tests of Geologic CO₂ Sequestration, April, 2010, American Association for the Advancement of Science, Washington, D.C.
64. Heath, J.E., Dewers, T.A., *McPherson, B.J.*, Kotula, P.G. **2010**. Pore-lining composition and capillary breakthrough pressure of mudstone caprocks: sealing efficiency of geologic CO₂ storage sites. AGU Fall Meeting, December 13–17, San Francisco, California.
63. Heath, J.E., *McPherson, B.J.*, and Dewers, T.A. **2010**. Natural noble gases and multi-scale assessment of caprock sealing behavior. Stanford University Global Climate and Energy Project and U.S. Geological Survey Workshop on Caprocks and Seals for

Geologic Carbon Sequestration, January 12–15, Asilomar Conference Grounds, Pacific Grove, California.

62. Han, Weon Shik, Lee, S.-Y., Lu, C., Dubois, M., *McPherson B.J.*, **2010**, CO₂ injection evaluation in the Arbuckle formation under Thrall-Aagard reservoir, Kansas, ARMA 44th U.S. Rock Mechanics Symposium, 27-30 June 2010, Salt Lake City, Utah.
61. S.L. Potter, W.-S. Han, J.L. Allen, S.-Y. Lee, *B.J. McPherson*, **2010**, M.A. Chan, DIAGENETIC IRON OXIDE PRECIPITATION: A PROXY FOR SUPERCRITICAL CO₂ SPATIOTEMPORAL FLOW, Geological Society of America Abstracts with Programs 42(2010) 211.
60. Lu C., Han, Weon Shik, McPherson B.J., Lichtner, P., **2010**, Effect of wettability of rock-CO₂-water system on the migration and distribution of geological sequestered supercritical CO₂, Proceedings of the AIChE Annual Meeting. Salt Lake City, Utah.
59. Han, Weon Shik, Stillman, G., Lu M., Lu C., McPherson B.J., Kim K.-Y., Lee S.-Y., **2010**, Injectivity changes and associated temperature disequilibrium study in pilot test site: Numerical study, 10th International Conference on Greenhouse Gas Technology, 19-23 September 2010, RAI, Amsterdam, Netherlands.

Previous years:

58. *McPherson, B. J.* and Thorne, D., **2008**, Geologic Carbon Sequestration: Challenges of Mitigation Planning. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., 2008.
57. Stauffer, P.H., Pawar, R.J., Han, Weon Shik, R., *McPherson, B. J.*, **2008**, Assessing the leakage potential of CO₂ into ground water resources at SACROC, west Texas. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., Abstract H14C-05, 2008.
56. Han, W.S., Lee, S.-Y., Lu, C., Thorne, D., Esser, R., *McPherson, B. J.*, **2008**, Analysis of heterogeneity length-scales on residual gas trapping and buoyancy-driven CO₂ migration. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., Abstract H12C-04, 2008.
55. Lu, C., Han, Weon Shik, Lee, S.-Y., Thorne, D., Esser, R., *McPherson, B. J.*, **2008**, Effects of density and mutual solubility of CO₂-brine system on CO₂ storage in geologic formations. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., Abstract H23D-0998, 2008.
54. Lee, S.-Y., Han, Weon Shik, Morgan, C., Lu, C., Esser, R., Thorne, D., *McPherson, B. J.*, **2008**, An overview of CO₂ sequestration at Farnham Dome site, Utah, USA. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., Abstract H23D-0992, 2008.
53. *McPherson, B.J.*, McColpin, G., Rutledge, J., Pawar, R., Deo, M., Rose, P., Lee, S.-Y., Han, Weon Shik, Lu, C., **2008**, Lessons learned from ongoing field tests of geologic CO₂ sequestration. EOS Trans. AGU, 89 (53), Fall Meet. Suppl., Abstract H13K-07, 2008.
52. Lee, S.-Y., Han, Weon Shik, Lu, C., *McPherson, B.J.*, Esser, R.P., **2008**, Effects of permeability heterogeneity on CO₂ sequestration in brine formation. Proceedings of the AIChE Annual Meeting. Philadelphia, PA. November 16-21.
51. *McPherson, B.J.*, Han, Weon Shik, Lee, S.-Y. Lu, C., Esser, R.P., **2008**, Mitigation planning for large-scale storage project: Multiple injection zones and reservoir pressure

reduction engineering design. Proceedings of the 9th International Conference on Greenhouse Gas Technology, 16-20 November 2008, The Omni Shoreham Hotel, Washington D.C.

50. Han, W.S., Lee, S.-Y., Lu, C., *McPherson, B.J.*, and Esser, R.P., **2008**, Role of correlation structure of permeability field on residual trapping mechanisms and buoyancy-driven CO₂ migration. Proceedings of the 9th International Conference on Greenhouse Gas Technology, 16-20 November 2008, The Omni Shoreham Hotel, Washington D.C.
49. Pawar, R., Carey, W., Han, W. S., *McPherson, B.J.*, Fessenden, J., Kazuba, J., and Keating, E., **2008**, A performance assessment of geologic sequestration of carbon dioxide at SACROC, west Texas, Proceedings of the 7th Annual Conference on Carbon Capture & Sequestration, Pittsburgh, Pennsylvania.
48. Han, W.S., *B.J. McPherson*, Lee, S.-Y., Esser, R.P., and Lu, C., **2008**, Quantitative comparison of thermophysical behavior of injected CO₂ in oil reservoir and brine formations, Proceedings of the 7th Annual Conference on Carbon Capture & Sequestration, Pittsburgh, Pennsylvania.
47. *McPherson, B.J.*, Han, W.S., M.D., Deo, S.-Y., Lee., **2008**, Evaluations of potential impacts of geologic carbon sequestration using numerical simulation. Proceedings of the AIChE Spring National Meeting. New Orleans, LA.
46. Han, W.S., *B.J. McPherson*, **2007**, Evaluation of CO₂ injection into brine formation below oil reservoir. EOS Trans. AGU, 88 (52), Fall Meet. Suppl., Abstract H12D-04, 2007.
45. Han, W.S., *B.J. McPherson*, **2007**, Advanced model analysis of CO₂ storage mechanisms at SACROC, site of 35 years of CO₂ injection. Proceedings of the AIChE Annual Meeting. Salt Lake City, Utah.
44. *McPherson, B.J.*, Li, L., Deo, M., Han, W.S., Liu, N., **2007**, Coupled hydrogeomechanical impacts of carbon sequestration. Proceedings of the AIChE Annual Meeting. Salt Lake City, Utah.
43. Han, W.S., *B.J. McPherson*, **2007**, Evaluation of CO₂ storage mechanisms at SACROC, site of 35 years of CO₂ injection, Proceedings of the 6th Annual Conference on Carbon Capture & Sequestration, Pittsburgh, Pennsylvania.
42. Allis, R., Bergfeld, D., Moore, J., McClure, K., Morgan, C., Chidsey, T., Heath, J. and *McPherson, B.*, **2005**, Implications of results from CO₂ flux surveys over known CO₂ systems for long-term monitoring, Proceedings of the Fourth Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
41. *McPherson, B. J. O. L.*, Heath, J. and Han, W., **2005**, 2-D Numerical Modeling of a Fault Zone Leaking Carbon Dioxide in East Central Utah: Implications for MMV Protocols, Proceedings of the Fourth Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)

40. *McPherson, B.*, **2005**, Carbon Sequestration Demonstration Options for the Southwestern U.S.: the Southwest Partnership on Carbon Sequestration, Proceedings of the Fourth Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
39. Heath, J. E., *McPherson, B. J.*, Allis, R. G., Bergfeld, D., Evans, J. P., Moore, J., **2005**, Carbon Dioxide Monitoring Strategies Predicated on Baseline Fluxes of Carbon Dioxide and Numerical Simulations of Natural Systems, Proceedings of the 2005 AGU Chapman Conference on The Science and Technology of Carbon Sequestration, American Geophysical Union, Washington, D.C.
38. *McPherson, B. J.*, **2005**, The Role of Numerical Modeling in Predicting, Monitoring, and Verifying Geologic Carbon Sequestration: The Problem of Scale (Again), Proceedings of the 2005 AGU Chapman Conference on The Science and Technology of Carbon Sequestration, American Geophysical Union, Washington, D.C.
37. Date, S., Bond, G. M., Liu, N., Villanova, T., Hockensmith, C., Stringer, S., Abel, A., and *McPherson, B. J.*, **2005**, Carbon Sequestration Through Biomimetic Catalysis of CaCO₃ Formation, Proceedings of the 2005 AGU Chapman Conference on The Science and Technology of Carbon Sequestration, American Geophysical Union, Washington, D.C.
36. Abel, A., McPherson, B., Lichtner, P., Pawar, R., Warpinski, N., Bond, G., Liu, N., Stringer, J. and Grigg, R., 2004, Analysis of Reactive Processes in a CO₂ Pilot Injection Test, Proceedings of the Third Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
35. McPherson, B., 2004, Carbon Sequestration Strategies for the Southwestern U.S.: the Southwest Partnership on Carbon Sequestration, Proceedings of the Third Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
34. McPherson, B., 2004, Summary of the Southwest Regional Partnership on Carbon Sequestration Regional Carbon Sequestration Partnerships Annual Program Review Meeting, Pittsburgh. http://www.netl.doe.gov/publications/proceedings/pro_toc.html
33. McPherson, B., 2004, Carbon Sequestration in the Southwest, Western Interstate Energy Board, Board of Directors Meeting, Albuquerque, NM.
32. McPherson, B., 2004, Carbon sequestration strategies for the Southwestern United States, Published Proceedings of the American Chemical Society National Meeting.
31. Fairhurst, C, Onstott, T C, Tiedje, J M, McPherson, B, Pfiffner, S M, and Wang, J S, 2004, Earth Science Research in DUSEL, a Deep Underground Science and Engineering Laboratory in the United States, EOS Transactions AGU, Volume 85, no. 47.
30. Allis, R, Bergfeld, D, Moore, J, Heath, J, and McPherson, B J, 2004, Implications of Soil Gas Survey Results Over Known Carbon Dioxide Systems for Long-term Monitoring, EOS Transactions AGU, Volume 85, no. 47.

29. Heath, J. and McPherson, B.J., 2004, 2-D Numerical Modeling of a Fault Zone Leaking Carbon Dioxide in East Central Utah, EOS Transactions AGU, Volume 85, no. 47.
28. Han, W., and McPherson, B.J., 2004, Assembly and Comparison of Different Equations of State for Multiphase Carbon Dioxide in the Subsurface, EOS Transactions AGU, Volume 85, no. 47.
27. McPherson, B. J., Heath, J., Han, W., and Koonce, J., 2004, Thermal Process Model Analysis to Explain the Origin and Accumulation of Subsurface CO₂: McElmo Dome Case Study, EOS Transactions AGU, Volume 85, no. 47.
26. Bond, G.M., McPherson, B., Abel, A., Lichtner, P., Grigg, R., and Stringer, J., 2003, Biomimetic and Geologic Mineralization Approaches to Carbon Sequestration, Proceedings of the Second Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
25. Grigg, R.B., McPherson, B.J., and Svec, R.K., 2003, Laboratory and Model Tests at Reservoir Conditions for CO₂-Brine-Carbonate Rock Systems Interactions, Proceedings of the Second Annual Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
24. Boutt, D., McPherson, B.J., Cook, B. K., Goodwin, L. B., Williams, J. R., Lee, M. Y., Patteson, R., 2003, Experimental Analysis of the Role of Fluid Transport Properties in Fluid-Induced Fracture Initiation and Propagation, EOS Transactions AGU, Volume 84, no. 46.
23. Boutt, D. F., Cook, B. K., McPherson, B. J.O.L., and Williams, J. R., 2003, Application of a directly coupled numerical model of fluid-solid mechanics, Proceedings of the 39th US Rock Mechanics Symposium, Soil and Rock America.
22. Bond, G. M., McPherson, B. J., Stringer, J., Wellman, T., Abel, A. and Medina, M., 2002, Enzymatically catalyzed CO₂ sequestration, Proceedings of the American Chemical Society, v. 223(pt.1), p. U565-U567.
21. Bond, G. M., Abel, A., McPherson, B. J., and Stringer, J., 2002, Brines as Possible Cation Sources for Biomimetic Carbon Dioxide Sequestration, EOS Transactions AGU, Volume 83, no. 47.
20. Abel, A., McPherson, B., Lichtner, P., Bond, G., Stringer, J., Grigg, R., 2002, Geologic Sequestration of CO₂: Potential Permeability Changes in Host Formations of the San Juan Basin, New Mexico, EOS Transactions AGU, Volume 83, no. 47.
19. McPherson, B., Grigg, R., Wellman, T., Svec, R., and Lichtner, P., 2002, Experimental Results and Simulation of Bench-Scale CO₂ Flow and Transport in Geologic Media, EOS Transactions AGU, Volume 83, no. 47.
18. Lee, R., Seright, R., Hightower, M., Sattler, A., Cather, M., McPherson, B., Wrotenbery, L., Martin, D., and Whitworth, M., 2002, Strategies for Produced Water Handling in New

- Mexico, Proceedings of the 2002 Groundwater Protection Council Produced Water Conference.
17. Boutt, D.F., Cook, B.K., McPherson, B.J.O.L, and Williams, J.R., 2002, Application of a Coupled Lattice-Boltzmann-Discrete Element Model to Problems in Geomechanics and Geohydrology, 2002, Proceedings of the 3rd International Discrete Element Conference, Santa Fe, NM.
 16. McPherson, B.J., and Whitworth, M., 2002, Brines in Deep Sedimentary Basin Aquifers: Formation Mechanisms and Regional-Scale Case Studies, Proceedings of the Clay Minerals Society 39th Annual Meeting, Boulder.
 15. Earman, S., McPherson, B. J. O. L., Phillips, F. M., Ralser, S., Herrin, J. M., 2002, Hydrogeologic Framework and groundwater characteristics of the San Bernadino Valley, Arizona and Sonora, GSA Abstracts with Programs, Volume 34, no. 6
 14. Boutt, D.F. and McPherson, B.J.O.L. 2002, The Role of Particle Shape and Packing in the Analysis of Rock Mechanical Behavior, Proceedings of the 3rd International Discrete Element Conference, Santa Fe, NM.
 13. McPherson, B. J. O. L., and Lichtner, P. C., 2001, CO₂ sequestration in deep aquifers, Proceedings of the First National Conference on Carbon Sequestration, Exchange Monitor Publications and Forums, Washington, D.C. (www.carbonsq.com)
 12. McPherson, B. J., Boutt, D., 2001, Simulating Triaxial Deformation Experiments with PFC2D: Studying Micromechanics to Gain Insight About Strain Localization in Sedimentary Rocks, Proceedings of DC Rocks - 38th U.S. Rock Mechanics Symposium, American Rock Mechanics Association, Washington D.C.
 11. Boutt, D., McPherson, B., Cook, B., and Williams, J., 2000, An Analysis of the Role of Fluid Pressure in Fracture Initiation and Propagation using Direct Simulation of Coupled Fluid-Solid Mechanics, EOS Transactions AGU, Volume 83, no. 47.
 10. McPherson, B. J. O. L., and Boutt, D., 2000, Fracture genesis: sedimentary basin evolution modeling with coupled geomechanical and hydrodynamic aspects, (*Invited Paper*), EOS, Transactions AGU, Volume 81, no. 48.
 9. McPherson, B. J. O. L., and Lichtner, P., 2000, CO₂ Sequestration in Deep Aquifers: Regional Scale Aspects and Unintended Contamination by Brines, EOS Transactions, American Geophysical Union Volume 81, no. 48.
 8. Boutt, D. F., and McPherson, B. J. O. L, 2000, Examining paleostress histories using laboratory tests, field observations, and particle flow modeling, GSA Abstracts with Programs, Volume 32, no. 7.
 7. McPherson, B. J. O. L., and Cole, B. S., 2000, Multiphase CO₂ flow, transport and sequestration in the Powder River Basin, Wyoming, U.S.A., Proceedings of the Geofluids 2000 Meeting, Barcelona, Spain.

6. Earman, S., Phillips, F. M., and McPherson, B. J. O. L., 1999, Insights into groundwater flow from geochemical and isotopic analysis of waters from springs and artesian wells, San Bernardino Valley, Arizona and Sonora, GSA Abstracts with Programs, Volume 31, no. 7.
5. McPherson, B. J. O. L., 1998, Criteria for Overpressure Development in Sedimentary Basins, EOS Transactions AGU, Volume 79, no. 45.
4. Cherney, J.C., Holcomb, D.J., and McPherson, B.J.O.L. , 1998, Origin and Timing of Fracturing in the Midland Basin, Texas, EOS Transactions AGU, Volume 79, no. 45.
3. McPherson, B.J.O.L. and Bredehoeft, J.D., 1997, Hydrodynamic history of the Uinta basin: Modeling fluid migration and overpressure, in Hendry, J. P., Carey, P. F., Parnell, J., Ruffell, A. H., and Worden, R. H., eds., Geofluids II '97, Proceedings of the Second International Conference on Fluid Evolution, Migration and Interaction in Sedimentary Basins and Orogenic Belts: Belfast, The Queen's University, p. 128-135.
2. McPherson, B., and Garven, G., 1996, Overpressures in the Sacramento Basin, California: Testing the Tectonic Vise Hypothesis (*Invited Paper*), EOS Transactions AGU, Volume 77, no. 46.
1. McPherson, B.J., and Bredehoeft, J.D., 1995, Basin Evolution, Fluid Pressures and Oil Migration: Uinta Basin, Utah (*Invited Paper*), GSA Abstracts with Programs, Volume 27, no.6.

PRESENTATIONS

Professional Presentations without Published Proceedings

- Characterization of the Most Promising Formations for Geologic Carbon Sequestration in the Southwestern United States - U.S. Department of Energy Kickoff Meeting for ARRA Site Characterization Project, Pittsburgh, Pennsylvania, **January, 2010**.
- Integrated Roles and Objectives of Modelling for Geologic Carbon Sequestration, International Energy Agency Carbon Capture and Storage Simulation Network Meeting, February 16-17, 2010, Ft. Douglas, University of Utah, Salt Lake City, **February, 2010**.
- Aquifer Risk Assessment Framework for Geologic Carbon Storage, Environmental Protection Agency Kickoff Meeting, Pittsburgh, Pennsylvania, **March, 2010**.
- INVITED PRESENTATION: Lessons Learned from Ongoing Field Tests of Geologic CO₂ Sequestration, April, 2010, American Association for the Advancement of Science, Washington, D.C. Invited Talk/Keynote, presented, **April, 2010**.
- INVITED PRESENTATION: Lessons Learned from Ongoing Field Tests of Geologic CO₂ Sequestration, June, 2010, American Rock Mechanics Association 44th U.S. Rock Mechanics Symposium, Salt Lake City, Utah. Invited Talk/Keynote, presented, **June, 2010**.
- Carbon Sequestration and the Southwest Regional Partnership for Carbon Sequestration – 2010, National Energy Technology Laboratory, U.S. Department of Energy Annual Project Review Meeting, Pittsburgh, Pennsylvania, **October, 2010**.

- Characterization of the Most Promising Formations for Geologic Carbon Sequestration in the Southwestern United States - National Energy Technology Laboratory, U.S. Department of Energy Annual Project Review Meeting, **October, 2010**.
- Status of Carbon Sequestration Science, Engineering and Policy in the United States, First Sino-U.S. Summit on Carbon Capture and Storage, December, 2010, Beijing, China. Invited Talk/Keynote, presented, **December, 2010**.
- INVITED PRESENTATION: Status of Carbon Sequestration Science, Engineering and Policy in the United States, Japan Geological Survey Conference on CCS, December, 2010, Tsukuba City, Japan. Invited Talk/Keynote, presented, **December, 2010**.

Previous years:

- Coupled Monitoring and Modeling of Geologic Carbon Sequestration - Invited Talk: Gas Technology Council Conference, 2007
- Potential Impacts of Geologic Carbon Sequestration - Invited Seminar: Tulsa Geological Society, 2007
- New Model Analyses of Geologic CO₂ Injection and Sequestration - SEG Conference, 2007
- Coupled Monitoring and Modeling of Geologic Carbon Sequestration - Invited Talk: U.S. Border Energy Forum, San Diego, CA, 2007
- Hydrogeomechanical Impacts of Geologic Carbon Sequestration - Invited Talk: New Mexico Tech Seminar Series, 2007
- Potential Impacts of Geologic Carbon Sequestration - Invited Talk: U.S. Council of State Governments, Oklahoma City, 2007
- Mitigating climate change: Using the science of faults and fractures in Utah to engineer carbon sequestration – 2006, Department of Civil and Environmental Engineering at the University of Utah, Salt Lake City, Utah.
- Mitigating climate change: Using the science of natural CO₂ systems to engineer carbon sequestration – 2006, Energy & Geoscience Institute at the University of Utah, Salt Lake City, Utah.
- Carbon Sequestration and the Southwest Regional Partnership for Carbon Sequestration – 2005, New Mexico Governor Richardson’s Energy Summit, Santa Fe, NM.
- Carbon Sequestration and the Southwest Regional Partnership – 2005, International CO₂ Study Tour, Colorado School of Mines, Golden, CO.
- Carbon Technologies and the Southwest Regional Partnership on Carbon Sequestration – 2005, Southwest Regional Partnership on Carbon Sequestration Conference, Albuquerque, NM.
- Reactive Transport Modeling – 2004, United States – Norway CO₂ Sequestration Training School convened by Los Alamos National Laboratory.
- Carbon Sequestration Options and the Southwest Regional Partnership on Carbon Sequestration – 2004, Southwest Regional Partnership on Carbon Sequestration Conference, Salt Lake City, Utah.
- Evaluating Carbon in the Southwest – the Southwest Regional Partnership on Carbon Sequestration – 2004, Southwest Regional Partnership on Carbon Sequestration Conference, Albuquerque, NM.

- Upscaling in hydrologic modeling – 2004, Hubbert Quorum Seminar at the USGS, Menlo Park, CA.
- EarthLab – 2003, National Underground Physics Laboratory Conf., Seattle, WA.
- Produced Water Desalination Options– 2003, Zeronet (Los Alamos NL produced water research initiative) Conference Albuquerque, NM.
- Carbon Capacities of the Southwestern U.S. – 2003, Southwest Regional Partnership for Carbon Sequestration Conference, Albuquerque, NM.
- Overview of Carbon Sequestration Technologies in the Southwest – 2003, NETL Carbon Sequestration Regional Partnerships Conference, Pittsburgh, Pa.
- Diagenesis and Basin Analysis – 2003, University of Utah Department of Geology and Geophysics Distinguished Lecture Series, Salt Lake City, UT.
- Brines and Overpressure in the Michigan Basin – 2002, University of Wisconsin, Madison, Geology Department Seminar Series.
- Evaluation of Fracture Mechanisms for the Spraberry Trend, Midland Basin - 2002, US Department of Energy Conference on Naturally Fractured Reservoirs, Norman, OK.
- Brines and Overpressure in the Michigan Basin – 2002, University of Michigan, Ann Arbor, Geology Department Seminar.
- Carbon Sequestration Science and Technology – 2002, Alberta Geological Survey, Alberta, Canada.
- Brines and Overpressure in the Michigan Basin – 2002, New Mexico Tech Hydrology Seminar Series.
- Overpressure and Fracture Genesis in the Spraberry Trend - 2002, University of Oklahoma Petroleum Engineering Department Seminar.
- Produced Water and the Pecos River – 2002, Produced Water Research Symposium, hosted by NM Office of State Engineer, Farmington, NM.
- Produced Water and the Pecos River – 2002, Department of Energy Technology Transfer Workshop, hosted by PRRC/DOE, Farmington, NM.
- Studies of CO₂ Migration in the Powder River Basin – 2002, Seminar given at the National Energy Technology Laboratory (DOE), Morgantown, WV.
- Underground Earth Science Research Opportunities and Needs – 2002, ARMA (Amer. Rock Mech. Assoc.), Washington, D.C.
- Invited Plenary Talk: "Earth Science and Engineering at the proposed National Underground Science Laboratory: Unique Possibilities" - NeSS 2002 (Neutrinos and Subterranean Science Workshop).
- Earth Science and Engineering at EarthLab – 2002, Hubbert Quorum Seminar at the USGS, Menlo Park, CA.
- Brine Formation in Deep Aquifers – 2001, Case Western Reserve University Geological Sciences Seminar Series, Cleveland, Ohio.
- Fracture Genesis Modeling with Coupled Geomechanical and Hydrological Aspects – 2000, Hubbert Quorum Seminar at the USGS, Menlo Park, CA.
- Multiphase CO₂ flow, transport and sequestration in the Powder River Basin, Wyoming, U.S.A. – 2000, AAPG Regional Meeting, Albuquerque, NM.

- Overpressures and Oil Migration in the Uinta Basin -1997, UNM, Geology Department Seminar.

COURSES TAUGHT

CVEEN 7920, Carbon Capture and Storage (2010)

CVEEN 3420, Hydrology (2007, 2008, 2009, 2010)

CVEEN 7920, Coupled Hydrologic Processes (2007)

HYD 403, Groundwater Hydrology (1998, 2000, 2001, 2004, 2005)

HYD 503, Groundwater Hydrology (1998, 2000, 2001, 2004, 2005)

HYD 503L, Groundwater Hydrology Lab (1998, 2000, 2001, 2004, 2005)

HYD 508, Flow and Transport in Hydrologic Systems (aka Fluid Mechanics for Geologists) (1997, 1999, 2004, 2005)

HYD 521, Coupled Hydrogeologic Processes (1998, 2000, 2001, 2002, 2006)

HYD 533 Practicum in Quantitative Methods (2000)

HYD 542, Numerical Simulation of Groundwater Hydrology (1997, 1999)

HYD/GEOL/GEOC/GEOP 592 Graduate Seminar (2004)

HYD/GEOL 589, Applied Sedimentary Basin Analysis (1999, 2000)

ADVISING

Current Postdoctoral Scholars (3)

Weon Shik Han, from New Mexico Institute of Mining and Technology

General Research Topic: Reactive Transport Modeling of CO₂ Sequestration

Si-Yong Lee, from University of California, Davis

General Research Topic: Stochastic Approaches to Subsurface Heterogeneity

Chuan Lu, from University of Southern California

General Research Topic: Massively Parallel Modeling of CO₂ Sequestration

Previous Postdoctoral Scholars (2)

Frank Zhang, from California Institute of Technology (at NMT)

General Research Topic: Molecular Dynamics Modeling for CO₂ Separation

Jianxin Wang, from New Mexico Institute of Mining and Technology (at NMT)

General Research Topic: Chemical Sensors for In Situ Subsurface Monitoring

Current Ph.D. Students (5)

Seong-Jun Lee, Ph.D. Student, University of Utah Civil and Environmental Engineering, Start date: August, 2008.

Richard Franz, Ph.D. Student, University of Utah Civil and Environmental Engineering, Start date: January, 2010.

Adam Olsen, Ph.D. Student, University of Utah Civil and Environmental Engineering, Start date: August, 2010.

Wei Jia, Ph.D. Student, University of Utah Civil and Environmental Engineering, Start date: August, 2010.

Vivek Patil, Ph.D. Student, University of Utah Civil and Environmental Engineering, Start date: August, 2010.

Graduated Ph.D. Students (5)

Jason Heath, Ph.D. Student, New Mexico Institute of Mining and Technology, GRADUATED DECEMBER, 2010. Dissertation Topic: Natural Tracers for Evaluating Subsurface Seal Formation Efficacy; Position following graduation: Professional Scientist, Sandia National Laboratories, Albuquerque, NM.

Weon Shik Han, Ph.D., GRADUATED JANUARY 2008
Dissertation Topic: CO₂ Sequestration; Multiphase Flow and Reactive Transport Studies, Position Following Graduation: Assistant Research Professor, Department of Civil and Environmental Engineering and EGI, University of Utah

Samuel Earman, Ph.D. Hydrology, 2004
(Co-advisor with Dr. Fred Phillips)
Dissertation: *Understanding the Hydrogeology of the San Bernadino Basin, Arizona*
Position Following Graduation: Postdoctoral Fellow, Desert Research Institute, Reno

David Boutt, Ph.D. Hydrology, 2004
Dissertation: *Characterizing the Relationship between Groundwater and Fracture Genesis*
Position Following Graduation: Assistant Professor, University of Massachusetts

Ucok Siagian, Ph.D. Petroleum Engineering, December 2000
Dissertation: *Wellbore Performance in Stress-Sensitive Reservoirs*
Position Following Graduation: Assistant Professor, Institut Teknologi Bandung, Indonesia

Current M.S. Students (4)

Richard Lyons, University of Utah Civil and Environmental Engineering, Start date: December, 2010.

Nathan Moodie, University of Utah Civil and Environmental Engineering, Start date: December, 2010.

Dana Dean, B.S. Mining Engineering, University of Utah, 2005; University of Utah Civil and Environmental Engineering, Start date: December, 2008.

Drew Haerer (New Mexico Tech M.S. student), B.S., Juniata College, 2005
Thesis Topic: Coal Hydrogeology, San Juan Basin

Graduated M.S. Students (6)

Aaron Abel, M.S. Hydrology (NMT), 2007
Thesis Topic: Investigation of Subsurface CO₂ Sequestration: CO₂ Plume Fringe Mineralization

Jennifer Smith, M.S. Hydrology, 2004
Thesis: *Investigation of Fracture Mechanisms in the Duchesne Fault Zone, Uinta Basin, Utah*
Position Following Graduation: Consultant, Hydrosphere, Socorro, NM.

Tristan Wellman, M.S. Hydrology, 2002
Thesis: *Modeling Reactive Transport Associated with CO₂ Sequestration in Deep Aquifers*
Position Following Graduation: Ph.D. Student, Colorado School of Mines

Jenny Cherney Sterling, M.S. Hydrology, 2001
Thesis: *Fracture Generation and Fluids in the Spraberry Formation, Midland Basin, Texas*
Position Following Graduation: Consultant, DBS Consulting, Albuquerque, NM.

Barret Cole, M.S. Hydrology, June 2000
Thesis: *Sequestration of Supercritical CO₂ in Deep Sedimentary Basin Aquifers: A Numerical Model*
Position Following Graduation: Consultant, Holly Engineering, New Hampshire.

Erika Bowen, M.S. Hydrology, December 1999
Thesis: *Hydrogeology of Rattlesnake Springs Area, Carlsbad, New Mexico*
Position Following Graduation: Drilling Engineer, Schlumberger, Houston, TX.

SERVICE **Editorship**

Associate Editor and Editorial Advisory Board Member, Hydrogeology Journal
2006 - 2010

Committees and Advisory Boards

Chairperson, Advisory Board for the Pacific Northwest National Laboratory Carbon Sequestration Initiative, **2009 - 2011**

Member, Advisory Board for the Institute of Geophysics and Planetary Physics at Los Alamos National Laboratory, **2010 - 2011** (<http://institute.lanl.gov/igpp/>)

Member, External Scientific Advisory Board for AltaRock Energy, Inc., 2008 - 2011

Chairperson, Risk Analysis and Simulation for Geologic Carbon Storage Workgroup, National Regional Carbon Sequestration Partnerships, **2010**

[The primary purpose of this workgroup was to develop the National Best Practices Manual of Risk Analysis and Simulation for Geologic Storage of CO₂, National Energy Technology Laboratory, Report DOE/NETL-2011/1459, 110 pp.]

Chairperson, U.S. Committee on Carbon Sequestration Modeling Research **2007-2011**

Previous years:

Co-Chair, U.S. Committee on Carbon Sequestration Monitoring and Verification, 2007-2009

Senate Briefing and Hearings

U.S. Senate - Two Briefings and Formal Hearings, National Carbon Sequestration Policy Speaker July 15, 2007 October 26, 2007

Conferences/Sessions Convened

Convenor, International Energy Agency Carbon Capture and Storage Simulation Network Meeting, **February 16-17, 2010**, Ft. Douglas, University of Utah, Salt Lake City (<http://www.co2captureandstorage.info/networks/2ndmodelling.htm>)

Co-Convenor, U.S. Dept. of Energy, Regional Conference on Site Characterization for Carbon Sequestration, **July 19-20, 2010**, Craig, Colorado.

Previous years:

Conference Session Chair – American Geophysical Union Meeting, December, 2008

Conference Session Co-Chairperson, AIChE Meeting, March, 2008

Conference Session Co-Chairperson, AIChE Meeting, November, 2007

Chairperson/Convenor, U.S. Dept. of Energy Convene National Modeling Workshop November, 2007

Chairperson/Convenor, U.S. Dept. of Energy Convene Regional Conference on Carbon Sequestration, July, 2007

Steering Committee – May, 2008 Seventh Annual Conference on Carbon Sequestration, U.S. Department of Energy and Exchange Monitor Publications and Forums. Details at <http://www.carbonsq.com>

Steering Committee – May, 2005 Fourth Annual Conference on Carbon Sequestration, U.S. Department of Energy and Exchange Monitor Publications and Forums. Details at <http://www.carbonsq.com/2005index.htm>

Main convenor – January, 2005, American Geophysical Union Chapman Conference, “The Science and Technology of Carbon Sequestration” Details at <http://www.agu.org/meetings/cc05acall.html>.

Main convenor – Annual Conferences of the Southwest Regional Partnership on Carbon Sequestration, 2003 – 2009.

Co-convenor – NeSS 2002: Neutrinos and Subterranean Science Workshop, Washington, D.C., September, 2002.

Grant Proposal and Journal Reviews

- ***Governmental Agencies***
 - Environmental Protection Agency
 - National Science Foundation
 - Wisconsin Water Resources Institute

- ***Journals***
 - AAPG Bulletin
 - Geofluids
 - Journal of Geophysical Research (JGR)
 - Water Resources Research

National/International Professional Committees:

- **Co-Chair of Geosciences Committee**, Henderson Underground Science and Engineering Project (HUSEP); information at <http://nngroup.physics.sunysb.edu/husep/>.
- **Chair** of Coupled Processes Working Group of the Deep Underground Science and Engineering Lab (DUSEL) S-1 Committee, under the auspices of the National Science Foundation.
- **Member** of International Board of Overseers, Homestake Underground Science Lab Initiative (DUSEL) – information at <http://neutrino.lbl.gov/Homestake/FebWS/>.

University of Utah Committees

CVEEN Faculty Search Committees, 2007 - 2008
USTAR Faculty Search Committee, 2007 - 2008

CVEEN Graduate Committee, 2006-2008

NMIMT Committees

- NMIMT Faculty Senate Space Utilization Committee, 2004-2005
- NMIMT Faculty Senate Student Discipline Committee, 2004-2005
- NMIMT Faculty Senate Parliamentarian, 2000-2001
- NMIMT Faculty Senate Nominating Committee, 2000-2001, 2001-2002
- NMIMT Faculty Senate Nominating Committee, 1999-2000
- EES Department Website Committee Chair, 1998-1999
- EES Department Chair Search Committee, 1997-1998
- Hydrology Faculty Search Committee Co-chair, 1997-1998
- Ph.D. Qualifying Exam Committee, 1997-1998

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Geological Society of America
- American Association of Petroleum Geologists

PUBLICITY

CO₂ Research and USTAR Initiative:

- **2010** - Interviewed by Rod Decker, Wednesday August 4th, for Decker's TV show, "Take Two" (broadcast in September, 2010)
- **2010** - AP wire story and Salt Lake Tribune: "U. professor gets \$5 million DOE grant to study CO₂ storage," <http://www.sltrib.com/sltrib/money/50260100-79/carbon-storage-doe-million.html.csp>
- **2010** - CNBC: "[Univ. of Utah wins grant for carbon capture](#)"
- **2010** - Ogden Standard Examiner - [U of U to study capture of CO₂ emissions](#)

Previous years:

- 2005 - Wall Street Journal
- KCPW - Radio Interview (2007)
- Salt Lake Tribune - Summary article about USTAR (2007)
- Deseret News - Summary article about USTAR (2007)
- November 16, 2007 Salt Lake Tribune, US - Putting a lid on global warming: http://www.sltrib.com//ci_7478872?IADID=Search-www.sltrib.com-www.sltrib.com
- November 20, 2007 -Salt Lake Tribune, US - Project plans to bury CO₂: http://www.sltrib.com//ci_7488186?IADID=Search-www.sltrib.com-www.sltrib.com
- November 21, 2007 - Daily Utah Chronicle, UT - Governor praises carbon sequestration research: <http://media.www.dailyutahchronicle.com/media/storage/paper244/news/2007/11/21/News/Governor.Praises.Carbon.Sequestration.Research-3113165.shtml>

- February 7, 2007 - Daily Utah Chronicle – ‘U hires researchers under USTAR initiative’
<http://media.www.dailyutahchronicle.com/media/storage/paper244/news/2007/02/07/News/U.Hires.Researchers.Under.Ustar.Initiative-2702033.shtml?sourcedomain=www.dailyutahchronicle.com&MIIHost=media.collegepublisher.com&mk ey=1921427>
- February 2, 2007 - KSL TV – <http://www.ksl.com/?nid=148&sid=855804>
- January 29, 2007 - Deseret Morning News: <http://deseretnews.com/dn/print/1,1442,655191737,00.html>, and http://www.sltrib.com/search/ci_5105042
- Discovery Channel Documentary - "Hot Planet" - McPherson interviewed about climate change and carbon storage. 12/08/2008
- Salt Lake Tribune - "Coal industry's message reaches campaigns" - article describes McPherson research. 10/26/2008
- Op-Ed piece in SL Tribune, entitled "Don't limit tools to fight rising CO2 by excluding carbon capture" authored by McPherson. SL Tribune Article ID: 9722753 06/27/2008
- SL Tribune Article "New teams, new faculty" outlines McPherson research with USTAR. SL Tribune Article ID: 8661778. 03/22/2008
- SL Tribune article "USTAR: Utah bets on science dollars" - outlines McPherson research with USTAR support. SL Tribune Article ID: 8658963. 03/22/2008

Earthlab:

- 2002: Nature, EOS (American Geophysical Union newspaper), Miami Herald, Salt Lake Tribune, San Jose Mercury News, Siliconvalley.com, Ezboard.com; 2003: Geotimes