

Stephen Gerard Osborn

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Geological Sciences Department
California State Water Initiative

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Education

Ph.D., University of Arizona, Hydrology (2010), Minor in Geoscience

Dissertation Research: *Elemental and isotope geochemistry of Appalachian Basin fluids: constraints on basin-scale brine migration, water-rock reactions, microbial processes, and natural gas generation*, Advisor: Dr. Jennifer McIntosh

M.S., Georgia State University, Geology (2006)

Graduate Research: *The Causes and Timing of Illite Formation in the Cretaceous Marias River Shale, Disturbed Belt, Montana*, Advisor: Dr. W. Crawford Elliott

M.S., University of California at Riverside, Soil Science (1997)

Graduate Research: *The Effects of Blended Drainage Water on Soil Physical Properties*, Advisor: Lanny Lund

B.S., University of California at Riverside, Environmental Science (1995)

Undergraduate Research: *Characterizing the Unsaturated Hydraulic Conductivity of Weathered Granitic Rock and Associated Soils*, Advisor: Laosheng Wu

Active Research Areas: Aqueous and Isotope Geochemistry, Hydrogeology, Natural Gas Geochemistry, Biogeochemistry, Water Quality, and Produced Waters

Academic and Professional Experience (since 1995)

- 2013- **Associate Professor**, California State Polytechnic University, Pomona, Geological Sciences Department
- 2013- **Adjunct Faculty**; Civil, Environmental, and Architectural Engineering; University of Colorado, Boulder
- 2011- **Research Faculty**, Water Resources and Policy Initiatives Program, California State University System
- 2011-2014 **Assistant Professor**, California State Polytechnic University, Pomona, Geological Sciences Department, Pomona, California
- 2010-2011 **Postdoctoral Research Fellow**, Duke University, Center on Global Change, Durham, NC. Advisors: Drs. Robert Jackson and Avner Vengosh
- 2006-2010 **Research Assistant**, University of Arizona, Hydrology and Water Resources, Aqueous Geochemistry Laboratory, Tucson, AZ.
- 2004-2006 **Research Assistant**, Georgia State University, Geology, Clay Mineralogy and Geochemistry Laboratory, Atlanta, GA.
- 2003-2004 **Assistant Project Manager**, Environmental Resolutions, Inc., Lake Forest, CA.
- 2001-2003 **Senior Staff Scientist**, Environmental Resolutions, Inc., Lake Forest, CA.
- 1999-2001 **Soil Scientist**, Groundwater and Environmental Services, Wall, NJ.

- 1998-1999 **Physical Science Technician**, USDA-ARS, Columbia Plateau Conservation Research Center, Soil and Water Conservation Unit, Pendleton, OR.
- 1997-1998 **Staff Research Associate (Level 1)**, U.S. Salinity Laboratory, Contaminant Fate and Transport Unit, USDA-ARS, Riverside, CA.
- 1995-1997 **Research Assistant**, University of California at Riverside, Soil and Environmental Sciences, Soil Chemistry Laboratory, Riverside, CA.

Refereed Publications

- Sherwood, O.A., Rogers, J.D., Lackey, G., Burke, T.L., **Osborn, S.G.**, and J.N. Ryan, 2016, Groundwater methane in relation to oil and gas development and coal seams in the Denver-Julesburg Basin of Colorado, Proceedings of the National Academy of Sciences of the United States (PNAS), c. 113, no. 30, pp. 8391-8396.
- Rogers, J.D., Burke, T.L., **Osborn, S.G.**, and Ryan, J.N., 2015, A Framework for Identifying Organic Compounds of Concern in Hydraulic Fracturing Fluids Based on Their Mobility and Persistence, Environ. Sci. Technol. Lett., 2, pp. 158-164.
- Osborn, S.G.**, Duffield, L.D., Elliott, W.C., Wampler, J.M., Elmore, R.D., and Engel, M.H., 2014, The timing of diagenesis and thermal maturation of the Cretaceous Marias River Shale, Disturbed Belt Montana, Clays and Clay Minerals, Vol. 62, No. 2, pp. 112-125. [DOI: 10.1346/CCMN.2014.0620204](https://doi.org/10.1346/CCMN.2014.0620204)
- Jackson, R.B., Vengosh, A., Darrah, T.H., Warner, N.R., Down, A., Poreda, R.J., **Osborn, S.G.**, Zhao, K., and Karr, J., 2013, Increased stray gas abundance in a subset of drinking water wells near Marcellus shale gas extraction, Proceedings of the National Academy of Sciences of the United States (PNAS), c. 110, no. 28, pp. 11250-11255. [doi: 10.1073/pnas.1221635110](https://doi.org/10.1073/pnas.1221635110)
- Warner, N.R., Jackson, R.B., Darrah, T., **Osborn, S.G.**, Down, A., Zhao, K., White, A., and Vengosh, A., 2012, Geochemical Evidence for Natural Migration of Marcellus-Like Brine to Shallow Drinking-Water in Pennsylvania, Proceedings of the National Academy of Sciences of the United States, v. 109, no. 30, pp. 11962-11966. [doi: 10.1073/pnas.1121181109](https://doi.org/10.1073/pnas.1121181109)
- Osborn, S.G.**, McIntosh, J.C., Hanor, J.S., and Biddulph, D., 2012, 129-iodine, ⁸⁷Sr/⁸⁶Sr, and trace elemental geochemistry of Appalachian Basin brines: Evidence of basinal-scale fluid migration and clay mineral diagenesis, American Journal of Science, v. 312, no. 3, pp. 263-287. [doi: 10.2475/03.2012.01](https://doi.org/10.2475/03.2012.01)
- Osborn, S.**, Vengosh, A., Warner, N., and Jackson, R., 2011. Methane contamination of drinking water accompanying gas-well drilling and hydro-fracturing, proceedings of the National Academy of Sciences of the United States of America (PNAS), v. 108, issue 20, pp. 8172-8176. [doi: 10.1073/pnas.1100682108](https://doi.org/10.1073/pnas.1100682108)
- McIntosh, J.C., Warwick, P., Martini, A.M., **Osborn, S.G.**, 2010, Coupled hydrology and biogeochemistry of Paleocene-Eocene coal beds, northern Gulf of Mexico, Geological Society of America (GSA) Bulletin, v. 122, pp. 1248-1264. [doi: 10.1130/B30039.1](https://doi.org/10.1130/B30039.1)
- Osborn, S.G.**, and J.C. McIntosh, 2010, Chemical and Isotopic Tracers of the Contribution of Microbial Gas in Devonian Organic-rich Shales and Reservoir Sandstones, Northern Appalachian Basin, Applied Geochemistry, v. 25, Issue 3, pp. 456-471. [DOI: 10.1016/j.apgeochem.2010.01.001](https://doi.org/10.1016/j.apgeochem.2010.01.001)
- Elliott, W.C., **Osborn, S.G.**, O'Brien, V.J., Elmore, R.D., Engel, M.H., and Wampler, J.M., 2006, On the Timing and Causes of Illite Formation and Remagnetization in the Cretaceous

Marias River Shale, Disturbed Belt, MT, *J. of Geochemical Exploration*, v. 89, pp 92-95.
[DOI: 10.1016/j.gexplo.2005.11.033](https://doi.org/10.1016/j.gexplo.2005.11.033)

Publications in Preparation

Osborn, S.G., Sherwood, O.A., Rogers, J.D., Lackey, G., Burke, T.L., and J.N. Ryan. Evidence for Biogenic Stray Gas in Denver-Julesburg Basin, Colorado. To be submitted to *Environmental Science and Technology Journal* Winter 2017.

Other non-referred publications

- McIntosh, J, Hamilton, S.E., Grasby, S.E., and S.G. **Osborn**, 2015, Reply to Ryan et al., comment on “Origins, distribution and hydrogeochemical controls on methane occurrences in shallow aquifers, southwestern Ontario, *Applied Geochemistry*, v. 63, pp. 446-450.
- Warner, NR, Jackson, R.B., Darrah, T.H., **Osborn**, S.G., Down, A., Zhao, K, White, A., and A. Vengosh, 2012, Reply to Engelder: Potential for fluid migration from the Marcellus Formation remains possible, *Proceedings of the National Academy of Sciences of the United States (PNAS)*, c. 109, no. 52, pp. E3626-E3626.
- Vengosh, A., Warner, N., **Osborn, S.**, and Jackson, R., 2011, Elucidating water contamination by fracturing fluids and formation waters from gas wells: Integrating isotopic and geochemical tracers, U.S. Environmental Protection Agency technical workshop in support of hydraulic fracturing research
- Jackson, R.B., **Osborn**, S.G., Vengosh, A., and NR Warner, 2011, Reply to Davies: Hydraulic fracturing remains a possible mechanism for observed methane contamination of drinking water, *Proceedings of the National Academy of Sciences of the United States (PNAS)*, c. 108, no. 43, pp. E872-E872.
- Osborn**, S.G., Vengosh, A., Warner, N.R., and R.B. Jackson, 2011, Reply to Saba and Orzechowski and Schon: Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing, *Proceedings of the National Academy of Sciences of the United States (PNAS)*, c. 108, no. 37, pp. E665-E666.
- Jackson, R.B., Pearson, B.R., **Osborn**, S.G., Warner, N.R., and A. Vengosh, 2011, Research and Policy Recommendations for Hydraulic Fracturing and shale-gas extraction, Center on Global Change, Duke University
- McIntosh, J. and **Osborn, S.**, 2010, Geochemical Evidence for Biogenic Gas Plays in Upper Devonian and Upper Ordovician Organic-rich Shales: Western New York and the Appalachian Basin, New York State Energy Research and Development Authority Report.

Grant Awards

- Hydrogeophysical Survey of Dos Palmas Springs and Natural Preserve, Bureau of Land Management (\$16, 275), Awarded October 2016 through October 2017.
- Sources of Water and Salinity at Dos Palmas Springs and Natural Preserve, Kellogg Foundation (\$10,988), Awarded May 2013 and funded through 2014.
- Improving the Classroom Experience (ICE) award (\$8,000) to purchase groundwater models in support of hydrogeology instruction and research, co-award with Dr. Jon Nourse.
- Routes to Sustainability for Natural Gas Development and Water and Air Resources in the American West, NSF-SRN (12 million for five years) to the University of Colorado, Boulder (Joseph Ryan P.I.). A-sub award was granted (\$750,000 for five years) as the water quality leader on main project (Osborn P.I.).

American Association of Petroleum Geologists Student Grants-in-Aid (\$2,000; 2007-2008), Completed
Geological Society of America Student Research Grant (\$2,500; 2007-2008), Completed
Geochemical evidence for biogenic gas plays in Upper Devonian and Upper Ordovician organic-rich shales: Western New York and the Appalachian Basin, in collaboration with Dr. Jennifer McIntosh (P.I.), New York State Energy Research and Development Authority and the United States Geological Survey (\$157,650), funded 2007, completed 2009 (participated as a graduate student in preparing this proposal).

Published Abstracts

Vanderwey, T. and S.G. Osborn, April 2016, Survey of Groundwater and Saline Springs that Rim the Williston Basin, Geological Society of America Cordilleran Regional Meetings, Ontario, California.

Robles, T., Osborn, S.G., and Van Buer, N., November 2015, Spring Discharge and Mineral Deposits Near Roberts Mine, San Gabriel Mountains, Southern California Conference for Undergraduate Research, Pomona, California

Heyer, G. and S.G. Osborn, November 2015, Water Quality in Santa Anita Canyon, Southern California Conference for Undergraduate Research, Pomona, California

Sherwood, O.A., Rogers, J.D., Lackey, G.D., Burke, T.L., Osborn, S.G., and J. Ryan, October 2014, Identification and Occurrence of Thermogenic Stray Gas in Groundwater Wells of the Denver-Julesburg and Piceance Basins of Colorado, Geological Society of America National Meetings, Vancouver, British Columbia, Canada

Dehart, J.N., **Osborn, S.G.**, and Ryan, J.N., September 2013, Transport of Selected Hydraulic Fracturing Fluid Organic Compounds through Aquifer Sediments in Laboratory Columns, American Chemical Society National Meetings, Indianapolis, IN.

Park, J., Sargent, J., and **Osborn, S.**, 2013, Dissolved gas geochemistry of shallow groundwater in areas of oil and gas extraction, Denver-Julesburg Basin, Colorado, abstracts with programs, Geological Society of America National Meetings, Denver, Colorado

Sargent, J., Park, J., and **Osborn, S.G.**, 2013, Sources of Fluids in Shallow Groundwater Near Natural Gas Extraction; Weld, Adams, and Boulder Counties, Colorado, abstracts with programs, Geological Society of America National Meetings, Denver, Colorado.

Gonzalez, J., and **Osborn, S.G.**, 2013, Water Quality of the Thompson's Creek Watershed, Claremont, CA, Abstracts with programs, Geological Society of America National Meetings.

Soto, P., Lenhert, L., Nourse, J., and **Osborn, S.**, 2013, Hydrogeology and Geochemistry of Bedrock Vs. Landslide-Sourced Springs in the Eastern San Gabriel Mountains, California, abstracts with programs, Geological Society of America National Meetings.

Wicks, L., Nourse, J., and **Osborn, S.**, 2013, Geological, Structural, and Geochemical Investigation of Robust Spring Discharge from a Major Landslide in the Eastern San Gabriel Mountains, California, abstracts with programs, Geological Society of America National Meetings.

Warner, N.R., Jackson, R.B., Darrah, T.H., **Osborn, S.G.**, Down, A., Zhao, K., White, A., and Vengosh, A., 2012, Reply to Engelder: Potential for fluid migration from the Marcellus Formation remains possible, Proceedings of the National Academy of Sciences of the United States of America, V. 109, is. 52, pp. E3626.

- Jackson, R.B., Vengosh, A., Down, A., Warner, N., **Osborn, S.**, Zhao, K., and Darrah, T., August 2012, Ecological and Environmental Dimensions of Shale Gas Extraction, Ecological Society of America National Meeting, Portland, OR
- Osborn, S.**, Warner, N., Vengosh, A., and Jackson, R., 2011, Dissolved Gas Geochemistry of Shallow Groundwater Systems in Pennsylvania and New York, Associated with Natural Gas Extraction, abstracts with programs, Geological Society of America Meetings, Minneapolis, MN.
- Osborn, S.** and McIntosh, J., 2011, Distinguishing the source of natural gas accumulations with a combined gas and co-produced formation water geochemical approach: A case study from the Appalachian Basin, U.S. Environmental Protection Agency technical workshop in support of hydraulic fracturing research
- McIntosh, J., **Osborn, S.**, and Grasby, S., 2009, Microbial methane generation in organic-rich shales linked to Pleistocene glacial recharge: Southwestern Ontario, Canada, GeoHalifax 2009 – 62nd Canadian Geotechnical Conference and 10th Joint CGS/IAH-CNC Conference, abstracts with programs.
- Osborn, S.G.**, McIntosh, J.C., Martini, A.M., and Hanor, J.S., 2009, Evidence for basinal-brine migration and water rock interactions from $^{129}\text{I}/\text{I}$, $^{87}\text{Sr}/^{86}\text{Sr}$ and trace metal geochemistry: northern Appalachian Basin, Geological Society of America Annual Meetings, abstracts with programs.
- Osborn, S.** and McIntosh, J., 2009, ^{129}I and Sr isotopes as tracers of large-scale fluid migration in the northern Appalachian Basin (USA), Goldschmidt 2009 Annual Conference, abstracts with programs.
- McIntosh, J., **Osborn, S.** and Grasby, S., 2008, Subglacial recharge into carbonate bedrock aquifers and generation of microbial methane in adjacent organic-rich shales: southwestern Ontario, Canada. American Geophysical Union Fall Meeting, abstracts with programs.
- Osborn, S.** and McIntosh, J., 2008. Origin and Distribution of Natural Gas in Devonian Black Shales, Northern Appalachian Basin, American Association of Petroleum Geologists, Eastern Section Annual Meetings, abstracts with programs.
- Osborn, S.** and McIntosh, J., 2008, Iodine-129 of Appalachian Basin Brine: Implications for Microbial Fractionation and Fluid Migration, Geological Society of America Annual Meetings, abstracts with programs.
- Elliott, W.C., **Osborn, S.G.**, Elmore, R. D., Engel, M.H., Totten, L., and O'Brien, V., 2008, Comparison of K-Ar Dates of Diagenetic Illite and Magnetic Characteristics in Concretions, Disturbed Belt, Montana, GSA Annual Meetings, abstracts with programs.
- McIntosh, J., Petsch, S., Schlegel, M., and **Osborn, S.**, 2007, Paleohydrologic controls on methanogenesis in organic-rich saline aquifers, American Geophysical Union Fall Meeting, abstracts with programs.
- Osborn, S.G.** and McIntosh, J.C., 2007, Origin and Distribution of Natural Gas in Upper Devonian Organic-Rich Shales, Appalachian Basin, Geological Society of America Annual Meetings, abstracts with programs.
- McIntosh, J., Warwick, P., Martini, A., and **Osborn, S.**, 2007, Coupled Hydrology and Biogeochemistry of Paleocene-Eocene Coal Beds, Northern Gulf of Mexico, Geological Society of America Annual Meetings, abstracts with programs.
- Osborn, S.** and McIntosh, J., 2007, Fluid and Gas Geochemistry of Organic-Rich Shales in the Appalachian Basin, American Association of Petroleum Geologists, Eastern Section Annual Meeting, abstracts with programs.

- Osborn, S** and Amrhein, C., 1997, The Effects of Blended Drainage Water on Soil Physical Properties, UC Salinity/Drainage Program, Division of Agricultural and Natural Resources, Annual Report, pp.164-176.
- Osborn, S.G.**, Wu, L., Graham, R.C., Shouse, P., and Osborn, J.F., 1995, Characterizing the Unsaturated Hydraulic Conductivity of Weathered Granitic Rock and Associated Soils, Soil Science Society of America, Annual Meetings, abstracts with programs.
- Osborn, S.G.** and Amrhein, C., October, 1997, The Effects of Blended Drainage Water on Soil Physical Properties, Centers for Water and Wildland Resources, Division of Agricultural and Natural Resources, University of California, UC Salinity/Drainage Program Annual Report 1996-97, pp. 164-176.
- Osborn, S. G.**, Amrhein, C., Letey, J., Wu, L., March, 1997, The Effects of Blended Drainage Water on Soil Physical Properties, Oral Presentation at UC-Salinity Task Force Annual Meetings, Sacramento, CA.
- Osborn, S.G.**, L. Wu, R.C. Graham, P, Shouse, & J.F. Osborn, May, 1996, Characterizing the Unsaturated Hydraulic Conductivity of Weathered Granitic Rock and Associated Soils, Poster Presentation at Sigma XI Honor Society Annual Meetings on Undergraduate Research, San Diego, Ca.
- Osborn, S. G.**, Amrhein, C., Letey, J., Wu, L., March, 1996, Unsaturated Hydraulic Conductivity of Soils Irrigated with Moderately Saline Drainage Water, Poster Presentation at UC-Salinity Drainage Task Force Annual Meetings, Sacramento, CA.
- Osborn, S.G.**, L. Wu, R.C. Graham, P, Shouse, & J.F. Osborn, October, 1995, Characterizing the Unsaturated Hydraulic Conductivity of Weathered Granitic Rock and Associated Soils. Poster Presentation at the ASA, CSA, SSSA Annual Meetings, St. Louis, MO.

Invited Scholarly Presentations

- Water Quality and Natural Gas Production, invited speaker; Earth, Planetary, and Space Sciences Department, University of California at Los Angeles, May 2014.
- Water Quality and Shale Gas Production: A Tale of Two Shales, Keynote Speaker, Hydrologic Sciences Research Symposium, University of Colorado, April 2014.
- Water Quality and Oil/Gas Production, National Academy of Science, Distinctive Voices Lecture Series, Beckman Center, Irvine, California, December 2013
- Invited Speaker and Panelist, July 2013, two-day forum on Science, Democracy, and Community Decisions on Fracking, sponsored by the Union of Concerned Scientists and UCLA Law, UCLA campus.
- Invited Speaker and Panelist, May 2013, Ceres Conference on Shale Energy and Water Hydraulic Fracturing, Horizontal Drilling and Risks to Groundwater Quality, Department of Civil, Environmental, and Architectural Engineering, University of Colorado, April 2013.
- Hydraulic Fracturing: Potential Impacts on Drinking Water, Iowa State University National Affairs Lecture Series, February 2012.
- Hydraulic Fracturing: An Environmental Perspective, Institute of Arctic and Alpine Research (INSTAAR), Department Seminar, University of Colorado, October 2011.
- Scientific Workshop: Potential Effects of Natural Gas Development on Water and Air in the West, University of Colorado, INSTAAR, and Colorado State University Sponsors, Keynote speaker, October 2011.
- Distinguishing the source of natural gas accumulations with a combined gas and co-produced formation water geochemical approach: A case study from the Appalachian Basin, U.S. EPA technical workshop in support of hydro-fracturing research, Alexandria, VA, Feb 2011.

Elemental and Isotope Geochemistry of Appalachian Basin Fluids: Constraints on Basin-scale Brine Migration, Clay Mineral Diagenesis, Microbial Processes, and Natural Gas Generation; Appalachian State University, Boone, N.C., October 2010.

Elemental and Isotope Geochemistry of Appalachian Basin Fluids: Constraints on Basin-scale Brine Migration, Clay Mineral Diagenesis, Microbial Processes, and Natural Gas Generation, Energy Research Program, USGS Headquarters, Reston VA, July 2010.

Research Direction (since 2011)

B.S. Thesis: Greg Van Osbree (2012), Jazmin Gonzalez (2013), Wendy Clark (2014), Jake Loukah (2014), Katrina Kaiser (2014), Ryan Edgley (2014), Patrick Thomas (2015), lisa seese (2015), Taylor Robles (2015), Chris Tafoya (2015), Ashley Espinoza (in progress)

M.S. Thesis: Joshua Sargent (2014), Maksymilian Wlodarczyk (2016), Debbie Kunath (in progress), Kenneth Craig (in progress), Kevin Garcia (in progress), Noah Zohbe (in progress)

Instruction

Undergraduate (Lower Division): Physical Geology, Physical Geology Laboratory, Water in a Changing World

Undergraduate (Upper Division): Natural Disasters, Soil Physics (with laboratory section), Geochemistry (with laboratory section), Hydrogeology (with laboratory section), Earth Science Seminar, Hydrogeology Field Module

Graduate: Advanced Hydrogeology (with laboratory section), Contaminant Fate and Transport (with laboratory section), Advanced Topics in Geosciences

Other areas of instruction: Isotope Tracers/Geochemistry, Elemental Cycling

Press

Interviewee, aired April 30, 2014, “Water Quality near oil and gas operations in Colorado”, Colorado Public Radio, Lesley McClerg (Reporter)

Interviewee, September 2013, “Did Floods Cause Fracking Disaster in Colorado?”, Newsweek, the Daily Beast, Josh Dzieza (Reporter).

Interviewee, September 2013, “Huerfano County to be part of \$12M National Science Foundation Water Quality Study Free Well Water Testing for Residents”, Huerfano World Journal.

Interviewee, aired September 27, 2013, “Culver City Fracking”, PBS SoCal, David Nazar (Reporter).

Interviewee, July 2013, “Water Researchers Converging on Weld to test Effects of Oil, Gas Drilling”, Greeley Tribune, Sharon Dunn (reporter).

Interviewee, July 2013. “Hydraulic Fracturing and Water in California”, KCET, Rachel Samuels (reporter).

Jackson, R.B., and Osborn, S.G., 2011. Swine and shale gas: lessons for N.C., Raleigh News and Observer Op-Ed.

Honors and Awards

Provost Teacher-Scholar (\$11,000; 2012-2014) Award, California State Polytechnic University, Pomona.

Meritorious Performance to Outstanding Graduate Teaching, University of Arizona (2009-2010)

Prentice Scholar, ARCS Foundation (\$7,000; 2009-2010)

Graduate College Fellowship, University of Arizona (\$24,000; 2009-2010)

Outstanding Teaching Assistant, Department of Hydrology and Water Resources (Fall, 2009)
Best Poster Award, El Dia Del Agua Symposium, Hydrology and Water Resources (2009)
Travel Grant, Goldschmidt Geochemistry Conference (\$1,000; 2009)
Outstanding Teaching Assistant, Department of Hydrology and Water Resources (Spring, 2009)
Fee Scholarship Award, Graduate College, University of Arizona (\$500; 2007-2008)
Howard Walton Clark Prize for Undergraduate Research, University of California (\$1000; 1994-1995).

Professional Service and Affiliations

Invited program reviewer, Department of Energy, National Energy Technology Laboratory (NETL), Office of Research and Development Merit Review
Reviewer for Journal of Applied Geochemistry
Reviewer for Hydrogeology Journal
Reviewer for Environmental Science and Technology Journal
Reviewer for Environmental Science: Processes and Impacts Journal
Reviewer for Chemical Geology
Reviewer for Environmental Protection Agency
Reviewer for American Chemical Society, Petroleum Research Fund
Reviewer for NSF-EAR Instrumentation and Facilities
Reviewer for NSF-Careers Program
Reviewer for NSF-Hydrologic Sciences
Member, American Chemical Society
Member, American Association of Petroleum Geologists
Member, Geological Society of America
Member, Sigma Gamma Epsilon National Earth Science Honor Society
Member, Golden Key National Honor Society