Jeff Langman, PhD

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Research interests: water-rock interactions, sulfide weathering, acid rock drainage remediation, environmental isotope geochemistry, and anthropogenic influences on water resources

Work Experience

Associate Chair 2024–present Department of Earth and Spatial Sciences, University of Idaho, United States Primary duties: undergraduate student marketing, recruitment, and retention; community college engagement; department projects Assistant/Associate Professor of Hydrogeochemistry 2015-present Metal Mobility Research Group, Department of Earth and Spatial Sciences University of Idaho, United States Primary duties: undergraduate and graduate hydrogeology and mining courses and research of mineral weathering, mobility of metals in mining-impacted environments, and hydrogeochemical tracers Geochemist 2023-2024 Newport News Nuclear BWXT, Los Alamos (sabbatical position) Primary duties: assist in remediation of groundwater plumes of chromium, tritium, perchlorate, and explosives in the Santa Fe Group Aquifer as part of the Los Alamos Legacy Cleanup at Los Alamos National Laboratory Research Fellow 2012-2014 Groundwater Geochemistry and Remediation Group, Department of Earth and Environmental Sciences University of Waterloo, Canada Primary duties: research of sulfide mineral oxidation and acid rock drainage, weathering experiments Visiting Assistant Professor/Teaching Fellow 2010-2012 Associated with Chemistry and Petroleum and Energy Engineering American University in Cairo, Egypt Primary duties: taught science courses within the Core Curriculum, Nile Basin hydrology investigations Hydrologist 2000-2012 New Mexico Water Science Center United States Geological Survey Primary duties: hydrologic resource investigations through inter-agency projects, aquifer and basin scale Research Assistant/Lecturer 2005-2009 Environmental Geochemistry Research Group, Department of Geological Sciences University of Texas at El Paso, United States Primary duties: non-traditional isotope and source-water tracking research, hydrogeology lecturer Geology Lecturer 2007-2009 Department of Geological Sciences El Paso Community College, United States Primary duties: taught undergraduate geology courses

UI Profile Google Scholar

1

Hydrogeochemist

Water and Environmental Hydrology Market Group Environmental Science Associates, United States *Primary duties:* NEPA/CEQA review of potential water resource impacts from anthropogenic influences

Research Assistant/Water Quality Assistant

1995–1997

Department of Natural Resources Management & Environmental Sciences California Polytechnic State University, San Luis Obispo California Central Coast Regional Water Quality Control Board, United States *Primary duties:* estuary and river monitoring, paired-watershed study for sediment and nutrient control

Education

- Ph.D. 2008 (Geology-Hydrogeochemistry), University of Texas at El Paso
- M.S. 1997 (Natural Resources-Hydrology), California Polytechnic State University, San Luis Obispo
- B.S. 1992 (Communications—Tech. & Bus.), California Polytechnic State University, San Luis Obispo

Teaching Experience

Associate Hydrologist

University of Idaho: Groundwater Hydrology, Chemical Hydrogeology, Environmental Hydrogeology, Geochemistry, Geology and the Environment, Economic Geology

University of Waterloo (guest lectures): Introductory Hydrology, Geochemistry, Environmental Geology

American University in Cairo: Scientific Thinking, Man and the Environment, General Science Lab

University of Texas at El Paso: Principles of Earth Science, Hydrogeology

El Paso Community College: Principles of Geology, Physical Geology, Historical Geology

Peer-Reviewed Publications

- Langman, J.B., Martin, J., 2025, Kinetic column evaluation of potential construction options for lessening solute mobility in backfill aquifers in restored coal mine pits, Powder River Basin, USA, Hydrology 12(1), doi: 10.3390/hydrology12010008
- Langman, J.B., 2024 (invited, Feature Papers in Sustainable Mining Engineering), Kinetic model evaluation of arsenic and selenium sources in waste rock of the Powder River Basin, USA, Mining 4(3), doi: 10.3390/mining4030027
- Martin J., Langman J.B., 2024, Leachate experiments to evaluate weathering of waste rock for backfill aquifers in restored coal mine pits, Powder River Basin, USA, Geosciences, 14(1), doi: 10.3390/geosciences14010004
- Langman, J.B., Gaddy, E., Link, T.E., Boll, J., Barnett, B., Hill, M., 2023 Isotope discrimination of source waters, flowpaths, and travel times at an acid-generating, lead-zinc-silver mine, Silver Valley, Idaho, USA, Water 15, doi: 10.3390/w15193362
- Swanson, G., Langman, J.B., Child, A.W., Wilhelm, F.M., Moberly, J.G., 2023, Iron and manganese oxidation states, bonding environments, and mobility in the mining-impacted sediments of Coeur d'Alene Lake, Idaho: core experiments, Hydrology 10(23), doi: 10.3390/hydrology10010023
- Buzzard, Q., Langman, J.B., Behrens, D., Moberly, J.G., 2023, Monitoring the ambient seismic field to track groundwater at a mountain–front recharge zone, Geosciences 13(9), doi: 10.3390/geosciences13010009
- Medici, G., Langman, J.B., 2022, Pathways and estimate of aquifer recharge in a flood basalt terrain: A review from the South Fork Palouse River Basin (Columbia River Plateau, USA), Sustainability 14, doi: 10.3390/su141811349

- Langman, J.B., Martin, J., Gaddy, E., Boll, J., Behrens, D., 2022, Snowpack aging, water isotope evolution, and runoff isotope signals, Palouse Range, Idaho, USA, Hydrology 9(94), doi: 10.3390/hydrology9060094
- Behrens, D., Langman, J.B., Brooks, E.S., Boll, J., Waynant, K., Moberly, J.G., Dodd, J.K., Dodd, J.W., 2021, Tracing δ¹⁸O and δ²H in source waters and recharge pathways of a fractured-basalt and interbeddedsediment aquifer, Columbia River Flood Basalt Province, Geosciences 11(10), doi: 10.3390/geosciences11100400
- Langman, J.B., Sandlin, W.R., Waynant, K., Traver-Greene, M., Moberly, J.G., 2021, Clinoptilolite and iron sorption/desorption under multiple pH conditions: Testing a substrate for passive treatment of acidic, ironrich solutions, Water Environment Research 93(9), doi: 10.1002/wer.1557
- Medici, G., Engdahl, N.B., Langman, J.B., 2021, A basin-scale groundwater flow model of the Columbia Plateau Regional Aquifer System in the Palouse (USA): Insights for aquifer vulnerability assessment, International Journal of Environmental Research, doi: 10.1007/s41742-021-00318-0
- Sandlin, W., Langman, J.B., Moberly, J.G., 2021, A review of acid rock drainage, seasonal flux of discharge and metal concentrations, and passive treatment system limitations, International Journal of Mining, Reclamation, and Environment 35(1), doi: 10.1080/17480930.2020.1728035
- Cooper, C.M., Langman, J.B., Sarathchandra, D., Vella, C.A., Wardropper, C.B., 2020, Perceived risk and intentions to practice health protective behaviors in a mining-impacted region, International Journal of Environmental Research and Public Health, doi: 10.3390/ijerph17217916
- Langman, J.B., Ali, J.D., Child, A.W., Wilhelm, F.M., Moberly, J.G., 2020 (feature article), Sulfur species, bonding environment, and metal mobilization in mining-impacted lake sediments: Column experiments replicating seasonal anoxia and deposition of algal detritus, Minerals 10, special issue (invited)—Pollutants in Acid Mine Drainage, doi: 10.3390/min10100849
- Sandlin, W., Langman, J.B., Waynant, K.V., Mukhopadhyay, M., Thuneman, T., Moberly, J.G., 2020, Comparison of APTES-functionalized silica fiber and clinoptilolite for reducing iron concentrations in an acidic, iron(II) sulfate solution: Potential passive treatment substrates for remediation of acid rock drainage, Mine Water and the Environment 39(4), doi: 10.1007/s10230-020-00721-7
- Langman, J.B., Behrens, D., Moberly, J.G., 2020, Seasonal formation and stability of dissolved metal particles in mining-impacted, lacustrine sediments, Journal of Contaminant Hydrology 232, doi: 10.1016/j.jconhyd.2020.103655
- Duckett, K., Langman, J.B., Bush, J.H., Brooks, E.S., Dunlap, P., Stanley, J.R., 2020, Noble gases, dead carbon, and reinterpretation of groundwater ages and travel time in local aquifers of the Columbia River Basalt Group, Journal of Hydrology, doi: 10.1016/j.jhydrol.2019.124400
- Langman, J.B., Sinclair, S.A., Amos, R.T., Wilson, D., Ptacek, C.J., Sego, D.C., Smith, L., Blowes, D.W., 2019, Alkalinity generation from weathering of accessory calcite and apatite and acid drainage neutralization in an Archean granitoid waste rock, Journal of Geochemical Exploration 205, doi: 10.1016/j.gexplo.2019.106341
- Duckett, K., Langman, J.B., Bush, J.H., Brooks, E.S., Dunlap, P., Welker, J.M., 2019 (cover article), Isotopic discrimination of aquifer recharge sources, subsystem connectivity, and flow patterns in the South Fork Palouse River Basin, Idaho and Washington, USA, Hydrology 6(15), doi: 10.3390/hydrology6010015

- Langman, J.B., Torso, K., Moberly, J.G., 2018, Seasonal and basinal influences on the formation and transport of dissolved trace metal forms in a mining-impacted riverine environment, Hydrology 5(3), doi: 10.3390/hydrology5030035
- Wilson, D., Amos, R.T., Blowes, D.W., Langman, J.B., Smith, L., Sego, D.C., 2018, Diavik Waste Rock Project: Scale-up of a reactive transport model for temperature and sulfide-content dependent geochemical evolution of waste rock, App. Geo. 96, doi: 10.1016/j.apgeochem.2018.07.001
- Langman, J.B., Moberly, J.G., 2018, Weathering of a mined quartz-carbonate, galena-sphalerite ore and release and transport of nanophase zinc carbonate in circumneutral drainage, Journal of Geochemical Exploration 188, doi: 10.1016/j.gexplo.2018.01.024
- Wilson, D., Amos, R.T., Blowes, D.W., Langman, J.B., Ptacek, C.J., Smith, L., Sego, D.C., 2018, Diavik Waste Rock Project: A conceptual model for temperature and sulfide-content dependent geochemical evolution of waste rock—Laboratory scale, Applied Geochemistry 89, doi: 10.1016/j.apgeochem.2017.12.007
- Langman, J.B., Veeramani, H., Blowes, D.W., Bailey, B., Wilson, D., Smith, L., Sego, D.C., Amos, R.T., Holland, S.P., 2017, Waste rock biogeochemistry in a permafrost environment: Examination of a cover design for a low sulfide, granitic waste rock, Geomicrobiology Journal 34(8), doi: 10.1080/01490451.2016.1238978
- Langman, J.B., Blowes, D.W., Amos, R.T., Atherton, C., Wilson, D., Smith, L., Sego, D.C., Sinclair, S.A., 2017, Influence of a tundra freeze-thaw cycle on sulfide oxidation and metal leaching in a low sulfur, granitic waste rock, Applied Geochemistry 76, doi: 10.1016/j.apgeochem.2016.11.010
- Langman, J.B., Blowes, D.W., Sinclair, S.A., Krentz, A., Amos, R.T., Smith, L.J.D., Pham, H.N., Sego, D., Smith, L., 2015, Early evolution of weathering and sulfide depletion of a low-sulfur, granitic, waste rock in an Arctic climate: a laboratory and field site comparison, Journal of Geochemical Exploration 156, doi: 10.1016/j.gexplo.2015.05.004
- Langman, J.B., Blowes, D.W., Veeramani, H., Wilson, D., Smith, L., Sego, D., Paktunc, D., 2015, The evolution of sulfur species and nickel coordination with weathering of pyrrhotite in a low-sulfide, granitic, waste rock, Chemical Geology 401, 169–179, doi: 10.1016/j.chemgeo.2015.02.024
- Langman, J.B., 2015, Spatial evolution of δ^2 H and δ^{18} O in the hydrologic cycle of the Nile Basin, Journal of Arid Land 7(2), doi: 10.1007/s40333-014-0078-5
- Langman, J.B., Moore, M.L., Ptacek, C.J., Smith, L., Sego, D., Blowes, D.W., 2014, Diavik Waste Rock Project: Evolution of mineral weathering, element release, and acid generation and neutralization during a five-year humidity cell experiment, Minerals 4, doi: 10.3390/min4020257
- Langman, J.B., Engdahl, N.B., 2014, Evaluation of a pressure pulse in a fractured-rock aquifer to reduce uncertainty of hydraulic conductivity measurements, Rio Grande Rift, New Mexico, United States, Water and Environment Journal 28(3), doi: 10.1111/wej.12040
- Langman, J.B., Ellis, A.S., 2013, Geochemical indicators of interbasin groundwater flow within the southern Rio Grande Rift, New Mexico, Environmental Earth Sciences 66(5), doi: 10.1007/s12665-012-1827-4
- Robertson, A.J., Henry, D.W., Langman, J.B., 2013, Geochemical evidence of groundwater flowpaths and the fate and transport of constituents of concern in the alluvial aquifer at Fort Wingate Depot Activity, New Mexico, 2009, U.S. Geological Survey Scientific Investigations 2013–5098, 89 p.

- Callegary, J., Langman, J., Leenhouts, J., Martin, P., 2013, Assuring water availability and quality in the 21st Century, Chapter 4, *in* Updike, R.G., Ellis, E.G., Page, W.R., Parker, M.J., Hestbeck, J.B., Horak, W.F. (eds.) United States–Mexican Borderlands—Facing Tomorrow's Challenges Through USGS Science, U.S. Geological Survey Circular 1380, 318 p.
- Langman, J.B., Sprague, J.E., and Durall, R.A., 2012, Geologic framework, regional aquifer properties (1940s– 2009), and spring, creek, and seep properties (2009–10) of the upper San Mateo Creek Basin near Mount Taylor, New Mexico: U.S. Geological Survey Scientific Invest. Report 2012–5019, 96 p.
- Langman, J.B., Ellis, A.S., 2010, Geologic influences on source-water mixing along a paleochannel in the Southern High Plains Aquifer, New Mexico, Carbonates and Evaporites 25(3), 247–265. doi: 10.1007/s13146-010-0029-y
- Langman, J.B., Ellis, A.S., 2010, A multi-isotope approach (δD, δ¹⁸O, ⁸⁷Sr/⁸⁶Sr, and δ¹¹B) for identifying saltwater intrusion and resolving groundwater evolution along the western Caprock Escarpment of the Southern High Plains, New Mexico, Applied Geochemistry 25(1), 159–174. doi: 10.1016/j.apgeochem.2009.11.004
- Ellis, A., Carney, M., Langman, J., 2010, Geochemical analysis of saline injection of concentrates and saline aquifers in El Paso, Texas, Southwest Consortium for Environmental Research and Policy in cooperation with the U.S. Environmental Protection Agency W-06-05, 28 p.
- Langman, J.B., 2009, Travel time of the Rio Grande in the Middle Rio Grande Basin, 2003–05, U.S. Geological Survey Scientific Investigations 2007-5292, 32 p.
- Langman, J.B., Robertson, A.J., Bynum, J., Gebhardt, F.E., 2008, Geochemical trends and natural attenuation of RDX, nitrate, and perchlorate in the Hazardous Test Area fractured-granite aquifer, New Mexico, 1996– 2006, U.S. Geological Survey Scientific Investigations 2008-5157, 45 p.
- Langman, J.B., Falk, S.E., Gebhardt, F.E., Blanchard, P.J., 2006, Groundwater hydrology and water quality of the Southern High Plains Aquifer, Cannon Air Force Base, Curry County, New Mexico, U.S. Geological Survey Scientific Investigations 2006-5280, 61 p.
- Langman, J.B., Nolan, E.O., 2005, Streamflow and water-quality trends of the Rio Chama and Rio Grande, northern and central New Mexico, water years 1985 to 2002, U.S. Geological Survey Scientific Investigations 2005-5118, 36 p.
- Langman, J.B., Anderholm, S.K., 2005, Effects of reservoir installation, San Juan-Chama Project water, and reservoir operations on streamflow and water quality in the Rio Chama and Rio Grande, northern and central New Mexico, 1938–2000, U.S. Geological Survey Scientific Investigations 2004-5188, 47 p.
- Langman, J.B., Gebhardt, F.E., Falk, S.E., 2004, Ground-water characterization of the High Plains Aquifer, Melrose Bombing Range, Cannon Air Force Base, Roosevelt County, New Mexico, 2002–03, U.S. Geological Survey Scientific Investigations 2004-5158, 42 p.
- Myers, N.C., Langman, J.B., 2004, Assessment of the potential for downward migration of landfill asbestos to the uppermost aquifer, Cannon Air Force Base, New Mexico, U.S. Geological Survey Report, 25 p.
- Wilcox, R.W., Langman, J.B., 2003, Hydrogeology and water quality of the Open Burn/Open Detonation Site at the Hazardous Test Area, U.S. Army White Sands Missile Range, New Mexico, 1996–2000, U.S. Geological Survey Report, 64 p.

Langman, J.B., 2002, Potential indicators of wastewater contamination in the bolson-fill aquifer, White Sands Missile Range, New Mexico, 2000, U.S. Geological Survey Report, 27 p.

Peer-Reviewed Conference Papers

- Ding, Longmire, Langman, 2024, Assessment of an Automated Computer Based Reducing Qualification System for Well Characterization at the Los Alamos National Laboratory, Waste Management Symposia
- Gaddy, Langman, Link, Barnett, Hill, 2022, Stable and radiogenic isotopes for tracing acid rock drainage from source to mine discharge, lead-zinc-silver mine, Silver Valley USA, International Conference on Acid Rock Drainage
- Wardropper, C., Cooper, C., Langman, J., Vella, C., and Sarathchandra, D., 2019, An application of a modified Health Belief Model: Assessing health beliefs and health protective behaviors in mining- impacted communities *in* Journal of Health Disparities Research and Practice 12(5), Article 9, https://digitalscholarship.unlv.edu/jhdrp/vol12/iss5/9
- Wilson, D., Amos, R.T., Blowes, D.W., Langman, J.B., Sego, D.C., Smith, L., 2018, Diavik Waste Rock Project: A mechanistic approach to the prediction of the geochemical evolution of sulfidic waste rock *in* Proceedings of the 11th International Conference on Acid Rock Drainage, International Mine Water Association Conference, ISBN 978-0-620-80650-3
- Wilson, D., Amos, R.T., Blowes, D.W., Langman, J.B., Sego, D.C., Smith, L., 2015, Diavik Waste Rock Project: Reactive transport simulation of sulfide weathering *in* Proceedings of the 10th International Conference on Acid Rock Drainage, International Mine Water Association Conference (GECAMIN), ISBN 978-956-9393-27-3
- Blowes, D.W., Holland, S.P., Sinclair, S.A., Langman, J.B., Bailey, B.L., Amos, R.T., Krentz, A., Smith, L., Ptacek, C.J., Pham, H.N., Sego, D.S., Macdonald, G., 2015, Diavik Waste Rock Project: An integrated study of waste rock evolution *in* Proceedings of the Symposium on Mines and the Environment, Canada
- Carney, M., Ellis, A., Bullen, T., Langman, J., 2009, Geochemistry of Yukon and Copper River tributaries, Alaska *in* Proceedings of the World Environmental and Water Resources Congress, 5857–5863

Non-Peer Reviewed Reports (Multiple Authors, Nonpublic)

- 2023 Backfill Geochemical Model and Treatments for Lessening Solute Mobility and Improving Aquifer Water Quality in Restored Coal Mine Pits, Powder River Basin, technical report and fact sheet for the U.S. Office of Surface Mining Reclamation and Enforcement
- 2020 Modular Passive Treatment System Utilizing Silicate Substrates for Reducing Seasonal Effects of Acid Rock Drainage on Primary Treatment Systems, technical report and fact sheet for the U.S. Office of Surface Mining Reclamation and Enforcement
- 2018 Inhibition of Sulfate-Reducing Bacteria in Lake Coeur d'Alene Sediment to Assess Contribution of Microbial Guilds to Metal Mobility: Determination of Inhibitory Concentrations, for Idaho Department of Environmental Quality
- 1999 North Slough Tidal Restoration Plan, Environmental Science Associates
- 1998 San Leandro Marshland Enhancement Monitoring Report, Environmental Science Associates
- 1996 & 1997 Annual Report for the Nonpoint Source Pollution and Treatment Measure Evaluation for the Morro Bay Watershed, Central Coast Regional Water Quality Control Board

Conference Abstracts

- Langman, 2024, Solutes: Nanomaterials and the Transport of Metals from Waste Rock, Idaho Mining Conference
- Langman, 2024, Backfill aquifers: solute mobility, predicting transport, and waste rock treatments, Office of Surface Mining Reclamation and Enforcement, Western Region Technology Transfer (invited presentation)
- Ding, Longmire, Langman, 2024, Assessment of an automated computer based reducing qualification system for well characterization at the Los Alamos National Laboratory, Department of Energy, Waste Management Symposia
- Langman, 2023, Adaptive management and chromium contamination at Los Alamos National Laboratory, Department of Energy Environmental Management and New Mexico Environment Department Technical Working Group
- Langman, 2023, Woods Hole Oceanographic Institute Introduction—Age dating groundwater in the Palouse Basin, Palouse Basin Aquifer Committee Palouse Basin Water Summit (invited presentation)
- Langman, Gaddy, Barnett, Hill, 2022, Isotope Tracing of Acid Drainage, Bunker Hill Mine, Idaho, American Exploration & Mining Association Annual Meeting
- Langman, 2022, University of Idaho and the Silver Valley: Bunker Hill Case Study, Idaho Mining Conference
- Martin, Langman, Waynant, Moberly, 2022, Laboratory experiments for evaluation of solute transport with construction of backfill aquifers in restored coal mine pits, Powder River Basin, Geological Society of America Connects
- Gaddy, Langman, Link, Barnett, Hill, 2022, Stable and radiogenic isotopes for tracking acid rock drainage from source to mine discharge, lead-zinc silver mine, Silver Valley, USA, 12th International Conference on Acid Rock Drainage
- Buzzard, Langman, Bartholomaus, Behrens, 2021, Tracking aquifer recharge through perturbations in the ambient seismic field along a mountain-front interface in the Columbia River Basalt Province, Geological Society of America Connects
- Langman, Swanson, Moberly, Wilhelm, 2021, Shifts in iron and manganese oxidation states, bonding environments, and mobility in mining-impacted lake sediments exposed to anoxic and anoxic + algal detritus experimental conditions, Goldschmidt
- Behrens, Langman, Brooks, Bartholomaus, Moberly, Wynant, 2020, Understanding recharge to a fracturedbasalt aquifer system via stable isotope discrimination, American Water Resources Association Annual Water Resources Conference
- Langman, 2020, ARD passive treatment system development: Substrate and structure, Office of Surface Mining Reclamation and Enforcement, Western Region Technology Transfer (invited presentation)
- Langman, Ali, Child, Wilhelm, Moberly, 2020, Sulfur species, bonding environment, and metal release in mining-impacted lake sediments under euxinic conditions, Geological Society of America Connects
- Behrens, Langman, Brooks, Bartholomaus, Moberly, 2020, Integrating stable isotope variation and seismic field perturbations to understand recharge to a fractured-basalt aquifer system, 62nd Idaho Academy of Science and Engineering Symposium, *accepted but delayed for presentation*

- Sandlin, Langman, Moberly, 2020, Development of a modular passive treatment system and evaluation of silicate fiber and mineral surfaces for reducing seasonal effects of acid rock drainage, 62nd Idaho Academy of Science and Engineering Symposium, *accepted but delayed for presentation*
- Wilson, Amos, Langman, Smith, Sego, Blowes, 2020, A mechanistic scale-up approach to the prediction of the geochemical evolution of sulfidic waste rock, Goldschmidt
- Langman, Moberly, 2019, ARD passive treatment system development: Substrate and structure, Office of Surface Mining Reclamation and Enforcement, Water Treatment Workshop (invited presentation)
- Blowes, Ptacek, Bain, Wilson, Amos, Langman, 2019, The geochemistry and hydrogeology of mill tailings and waste rock: Implications for mine-waste management and remediation, Goldschmidt
- Cooper, Wardropper, Langman, Vella, Sarathchandra, 2019, An application of the Health Belief Model: Assessing the likelihood of taking health protective actions in mining-impacted communities, International Symposium on Society and Resource Management
- Langman, Moberly, Behrens, 2019, Formation, stability, and transport of nanophase metal particles in miningimpacted lacustrine sediments, Coeur d'Alene River Basin, Idaho, 15th International Conference on the Biogeochemistry of Trace Elements
- Child, Langman, Wilhelm, Moberly, 2019, Effects of algae-induced eutrophication on metal mobility in contaminated sediments collected from the mining-impacted Coeur d'Alene Lake, Idaho, 15th International Conference on the Biogeochemistry of Trace Elements
- Sandlin, Langman, Moberly, 2019, Functionalized synthetic silica fiber vs. zeolite for iron removal from simulated acid rock drainage, 15th International Conference on the Biogeochemistry of Trace Elements
- Sandlin, Langman, Moberly, 2019, Passive metal removal system utilizing zeolite for initial treatment of seasonal acid rock drainage—New technology for enhancing passive treatment systems, Northwest Scientific Association Annual Meeting
- Duckett, Langman, 2019, Dead carbon and necessary adjustments to carbon dating of groundwater in a deep aquifer in the Columbia River Basalt Group, Northwest Scientific Association Annual Meeting
- Moberly, Child, Langman, Wilhelm, 2019, Eutrophication induced metal mobility in Coeur d'Alene Lake, 18th Annual Northern ID/Eastern WA Regional Lake Conference
- Wilson, Amos, Blowes, Langman, Smith, Sego, 2018, Diavik Waste Rock Project: Scale-up of a reactive transport model for temperature and sulfide-content dependent geochemical evolution of waste rock, IMWA 11th International Conference on Acid Rock Drainage
- Langman, Moberly, Child, 2018, Formation and stability of nanophase metal particles in mining-impacted lacustrine sediments, Resources for Future Generations
- Duckett, Langman, 2018, Isotopic tracers for discriminating recharge and subsystems in a Columbia River Basalt Group Aquifer, Geological Society of America, Cordilleran Section
- Child, Moberly, Langman, 2018, Evaluation of metal mobility in Lake Coeur d'Alene sediments with alteration of oxidation-reduction conditions from a simulated algal bloom, Society for Freshwater Science Annual Meeting
- Wilson, Amos, Blowes, Langman, Ptacek, Smith, Sego, 2017, Diavik Waste Rock Project: Scale-up of a reactive transport model for temperature and sulfide dependent geochemical evolution, Goldschmidt

- Langman, Moberly, 2017, Natural metal nanoparticles and disassociation buffering in circumneutral mine drainage, Goldschmidt
- Peach, Child, Langman, Moberly, 2017, What is the fate of heavy metals at the bottom of Lake Coeur d'Alene under anoxic conditions? Idaho Conference on Undergraduate Research
- Larsen, Hudson, Peach, Child, Langman, Moberly, 2017, Exploring the fate of heavy metals in anaerobic Coeur d'Alene Lake sediment, Idaho Network of Biomedical Research Excellence Research Conference
- Torso, Moberly, and Langman, 2016, Seasonal controls on the formation and transport of metal nanoparticles in a mining-impacted riverine environment, Rocky Mountain Section, GSA, 68th Annual Meeting
- Langman, Veeramani, Blowes, Wilson, Smith, Sego, Amos, and Holland, 2016, Waste rock biogeochemistry in a permafrost environment: Examination of a cover design for a low sulfide, granitic waste rock, National Groundwater Association Water Summit
- Wilson, Amos, Blowes, Langman, Sego, and Smith, 2015, Diavik Waste Rock Project: Reactive transport simulation of sulfide weathering, IMWA 10th International Conference on Acid Rock Drainage
- Sinclair, Langman, Krentz, Amos, Sego, Smith, and Blowes, 2014, Temporal and spatial contributions to element release from a low sulfide waste rock pile in the Canadian Arctic, GSA Annual Meeting
- Langman, Holland, Sinclair, Wilson, Smith, Sego, and Blowes, 2014, Weathering evolution of nickel and sulfur in pyrrhotite within a low-sulfide, granitic, mine-waste rock in the Canadian Arctic, Goldschmidt
- Sinclair, Langman, Blowes, Sego, and Smith, 2014, Influence of freeze-thaw dynamics on weathering and element release from a low-sulfide, waste-rock pile in the Canadian Arctic, Geological Association of Canada and Mineralogical Association of Canada Joint Annual Meeting
- Langman, Holland, Sinclair, and Blowes, 2013, Controls on weathering of pyrrhotite in a low-sulfide, granitic mine-waste rock in the Arctic, Canada, AGU Fall Meeting
- Langman, 2012, Uncertainty in the downscaling of climate models for regional climate change predictions and the possibility of water-quality proxies to reduce base data unreliability, Nile Basin example, 50th Estuarine and Coastal Shelf Science
- Langman, 2011, Globalizing local hydrologic data for validation of regional climate change predictions and the understanding of resource dynamics in areas of increasingly stressed hydrologic resources, Arab-American Frontiers Symposium
- Langman and Ellis, 2009, Saltwater intrusion and cross-formational flow in the Southern High Plains Aquifer along the western Caprock Escarpment, New Mexico, NGWA Ground Water Summit
- Langman, 2009, A multi-isotope approach to resolve geochemical evolution of groundwater affected by multiple source waters, cross-formational flow, saltwater intrusion, and agricultural recharge, Smithsonian Tropical Research Institute Symposium on Tropical Hydrology
- Ellis, Langman, Carney, 2009, Weathering in central Alaskan Rivers: sulfur sources and cycling using S and O Isotopes, AGU Fall Meeting
- Carney, Ellis, Bullen, and Langman, 2009, Isotope geochemistry of the Yukon and Copper Rivers, Alaska: continental weathering in a changing environment, 23rd Annual UTEP Geological Sciences Colloquium
- Carney, Ellis, and Langman, 2008, Geochemistry of the Yukon and Copper River tributaries in Alaska: continental weathering in a changing environment, AGU Fall Meeting

Langman and Ellis, 2007, A multi-isotope (O, H, Sr, B) and age-dating (³H-³He, ¹⁴C) study of saline-water intrusion and cross-formational flow in the Southern High Plains Aquifer, AGU Fall Meeting

Competitive Grants and Contracts Awarded

University of Idaho:

Funding Agency: University of Idaho, College of Science
Funded Entity: University of Idaho: Chemistry, Earth and Spatial Sciences, Chemical Engineering— Waynant, Langman, Moberly, Roll
Funding: \$95,000
Title: Mine Waste Remining for Extraction of Critical Minerals to Support Electrification
Role: co-PI
Dates: 2025–2027

Funding Agency: Palouse Basin Aquifer Committee
Funded Entity: University of Idaho: Earth and Spatial Sciences, Water Resources—Langman, Link
Funding: \$190,000
Title: Differentiating Recharge Zones along the Eastern Margin of the South Fork Palouse River Basin
Role: PI
Dates: 2025–2027

Funding Agency: Teck Resources

Funded Entity: University of Idaho: Earth and Spatial Resources, Water Resources, Chemical Engineering—Langman, Link, Aston

Funding: \$400,000 (\$275,000 + \$125,000 of in-kind services for mine flights, housing, drilling, sample collection, and sample shipping)

Title: Evaluation of changes in acid rock drainage and iron sulfide weathering in the main waste stockpile, Red Dog Mine

Role: **PI** *Dates:* 2024–2026

Funding Agency: Bunker Hill Mining Corporation

Funded Entity: University of Idaho, Earth and Spatial Sciences, Water Resources, Chemical Engineering— Langman, Link, Bernards

Funding: \$200,000

Title: A reaction cell experiment to evaluate the generation of reactive cap alkaline water and its interaction with pyritic waste rock and ore

Role: PI

Dates: 2023–2025

Funding Agency: Bunker Hill Mining Corporation

Funded Entity: University of Idaho, Geography & Geological Sciences, Water Resources—Langman, Link

Funding: \$97,000 + \$132,000 of in-kind services for sample collection and analysis

Title: Use of stable and radiogenic isotopes for identification of major infiltration zones and source-water mixing in the Revett Formation, Bunker Hill Mine

Role: **PI**

Dates: 2021–2023

Funding Agency: Department of the Interior, Office of Surface Mining Remediation and Enforcement Funded Entity: University of Idaho, Geological Sciences, Chemical Engineering, Chemistry, Soil & Water Systems—Langman, Moberly, Waynant, Strawn Funding: \$200,000

Title: Backfill geochemical model and treatments for lessening solute mobility and improving aquifer water quality in restored coal mine pits, Powder River Basin

Role: **PI** *Dates:* 2021–2023

Funding Agency: U.S. Geological Survey, Idaho Water Resources Research Institute

Funded Entity: University of Idaho, Department of Geological Sciences-Langman, Moberly, Brooks,

Waynant, and Bartholomaus

Funding: \$15,000

Title: Snowpack aging, evolution of snow δ^2 H and δ^{18} O, and alteration of the snowmelt recharge signal to a multi-layer aquifer system

Role: PI

Dates: 2020–2021

Funding Agency: Palouse Basin Aquifer Committee

Funded Entity: University of Idaho, Department of Geological Sciences—Langman, Moberly, Brooks, Bush, Dunlap, and Bartholomaus

Funding: \$62,500

Title: Tracking aquifer recharge using isotope signals and perturbations in the ambient seismic field of the Palouse Range recharge zone

Role: **PI** *Dates:* 2019–2022

Funding Agency: National Institutes of Health, Mountain West CTR-IN

Funded Entity: University of Idaho, Departments of Natural Resources, Geological Sciences, Water Resources, Movement Sciences, Virtual Technology—Wardropper, Langman, Cooper, and Vella Funding: \$66,000
 Title: Perceptions of lead contamination and behavioral intentions in a mining region Role: co-PI

Dates: 2018–2019

Funding Agency: Idaho INBRE Bioinformatics Core Technology Access Program

Funded Entity: University of Idaho, Departments of Chemical Engineering, Geological Sciences— Moberly, Langman, Wilhelm

Funding: \$5,760

Title: Utilizing Modern Molecular Bioinformatics to Inform Lake Management Practices

Role: co-PI

Dates: 2018–2019

Funding Agency: National Science Foundation, Idaho EPSCoR

Funded Entity: University of Idaho, Departments of Chemical Engineering, Geological Sciences, Natural Resources—Moberly, Langman, Wilhelm, and Harrington

Funding: \$162,500

Title: Evaluation of zinc mobility and microbial dynamics in Coeur d'Alene Lake sediments with alteration of oxidation-reduction conditions from a simulated algal bloom

Role: **co-PI** *Dates:* 2017–2018

Funding Agency: U.S. Geological Survey, Idaho Water Resources Research Institute

Funded Entity: University of Idaho, Departments of Geological Sciences and Chemical Engineering— Langman and Moberly Funding: \$25,000

Title: Influence of sulfur form on metal mobility and water quality in a mining-impacted lateral lake of the Coeur d'Alene River

Role: **PI** *Dates:* 2017–2018

Funding Agency: Canadian Light Source, Soft X-ray Microcharacterization Beamline Funded Entity: University of Idaho, Departments of Geological Sciences and Chemical Engineering— Langman and Moberly *Funding:* beamtime award *Title:* Alteration of the sulfur-metal relation in weathering sulfides with the seasonal flux of miningimpacted lacustrine sediments Role: PI Dates: 2017–2018 Funding Agency: Idaho Department of Environmental Quality Funded Entity: University of Idaho, Departments of Chemical Engineering and Geological Sciences— Moberly and Langman *Funding:* \$7,000 (supplemental funding for NSF EPSCoR Coeur d'Alene project) Title: Water quality, 16S rRNA sequencing, and metagenomic analysis of Lake Coeur d'Alene sediments Role: co-PI Dates: 2017–2018 Funding Agency: U.S. Department of the Interior, Office of Surface Mining Funded Entity: University of Idaho, Departments of Geological Sciences and Chemical Engineering-Langman, Veeramani, and Moberly Funding: \$200,000 *Title:* A passive metal removal system utilizing functionalized nanoparticles for initial treatment of seasonal acid rock drainage-new technology for enhancing passive treatment systems Role: PI Dates: 2016–2019 Funding Agency: U.S. Geological Survey, Idaho Water Resources Research Institute Funded Entity: University of Idaho, Department of Geological Sciences-Langman Funding: \$15,000 Title: Seasonal flux of environmental conditions and metal solutes in the shallow groundwater environment of the mining-impacted upper Coeur d'Alene River Basin Role: PI Dates: 2016–2017 Funding Agency: University of Idaho, Office of Research and Economic Development Funded Entity: University of Idaho, Department of Geological Sciences-Langman Funding: \$12,000 *Title:* A passive extraction method for the preservation of porewater metal nanoparticles formed in miningimpacted sediments Role: PI Dates: 2016-2017

Funding Agency: Palouse Basin Aquifer Committee *Funded Entity:* University of Idaho, Department of Geological Sciences—Langman *Funding:* \$36,000 *Title:* Geochemical tracers for improving the Palouse Basin recharge model and understanding travel time in Columbia River Basalt Group aquifers *Role:* **PI**

Dates: 2016–2017

University of Waterloo:

Funding Agency: Argonne National Laboratory, Advance Photon Source, GSECARS
 Funded Entity: University of Waterloo, Groundwater Geochemistry and Remediation Group—Langman, Veeramani, and Blowes
 Funding: beamtime award
 Title: Assessment of Ni and Zn coordination and Fe mineral phases in alteration fronts and distal Fe precipitates of weathered pyrrhotite grains
 Role: PI
 Dates: 2014–2016

Funding Agency: Natural Sciences and Engineering Research Council of Canada
Funded Entity: University of Waterloo, Groundwater Geochemistry and Remediation Group—Blowes, Smith, Sego
Funding: \$500,000
Title: Integrated study of waste rock evolution at a diamond mine in the Northwest Territories
Role: co-investigator
Dates: 2012–2015

 Funding Agency: Diavik Diamond Mine, Northwest Territories, Canada
 Funded Entity: University of Waterloo, Groundwater Geochemistry and Remediation Group—Blowes, Smith, Sego
 Funding: \$150,000 (in-kind services)
 Title: Integrated study of waste rock evolution at a diamond mine in the Northwest Territories
 Role: co-investigator
 Dates: 2012–2015

 Funding Agency: Argonne National Laboratory, Advance Photon Source, GSECARS
 Funded Entity: University of Waterloo, Groundwater Geochemistry and Remediation Group—Langman, Holland, and Blowes
 Funding: beamtime award
 Title: XRF mapping, EXAFS, XANES, and μ-XRD assessment of sulfide weathered rims
 Role: PI
 Dates: 2013–2014

American University in Cairo:

Funding Agency: Research Institute for a Sustainable Environment
 Funded Entity: American University in Cairo, School of Sciences and Engineering–Canfield and Langman
 Funding: \$110,000
 Title: Salinity and climate change in the Nile Delta
 Role: co-investigator
 Dates: 2010–2012

U.S. Geological Survey:

Funding Agency: U.S. Forest Service, Cibola National Forest *Funded Entity:* U.S. Geological Survey, New Mexico Water Science Center—Langman Funding: \$350,000

Title: Investigation of uranium contamination and water resources of the San Mateo Creek Basin at Mount Taylor, New Mexico

Role: **PI** *Dates:* 2009–2012

Funding Agency: U.S. Army Corps of Engineers, Fort Wingate Army Depot Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Gebhardt and Langman Funding: \$1,500,000 Title: Investigation of chlorinated solvent and perchlorate contamination in the unconfined and confined aquifers at Fort Wingate Role: co-PI Dates: 2008–2012 Funding Agency: U.S. Air Force, Walker Air Force Base Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Wilcox and Langman Funding: \$175,000 *Title:* Investigation of chlorinated solvent contamination of the upper aquifer through push/pull drilling and portable gas chromatograph application, Walker Air Force Base Role: co-PI Dates: 2005-2007 Funding Agency: U.S. Army, White Sands Missile Range Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Vogler, Gebhardt, and Langman Funding: \$300,000 *Title:* Investigation of nitrate and organic contaminant plumes irradiating from historic disposal areas, White Sands Missile Range Role: co-PI Dates: 2005–2007 Funding Agency: Albuquerque-Bernallilo County Water Authority Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Anderholm and Langman Funding: \$2,500,000 Title: Investigation of effects of San Juan Chama Project on Rio Grande Basin water resources Role: co-PI Dates: 2003-2010 Funding Agency: State of New Mexico, Environment Department Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Langman Funding: \$75,000 Title: Chlorinated solvents in the vadose zone around the Fruit Avenue Plume Superfund site, Albuquerque Role: PI Dates: 2003–2004 Funding Agency: U.S. Army, White Sands Missile Range Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Wilcox, Gebhardt, Langman Funding: \$4,000,000 *Title:* Investigation of explosives and perchlorate contamination in the fractured rock aquifers at the Open Burn/Open Detonation Site at the Hazardous Test Area, White Sands Missile Range

Role: **co-PI** *Dates:* 2000–2010 Funding Agency: U.S. Air Force, Cannon Air Force Base

Funded Entity: U.S. Geological Survey, New Mexico Water Science Center—Gebhardt and Langman *Funding:* \$2,000,000

Title: Investigation of explosives contamination of the shallow sedimentary aquifer in the Ogallala aquifer complex at Melrose Bombing and Gunnery Range

Role: co-PI

Dates: 2000–2009

Funding Agency: U.S. Air Force, Cannon Air Force Base

Funded Entity: U.S. Geological Survey, New Mexico Water Science Center-Gebhardt, Smith, and

Langman

Funding: \$1,000,000

Title: Investigation of wastewater, fuels, and solvent contamination of Ogallala aquifer at Cannon Air Force Base

Role: co-PI

Dates: 2000-2009

Funding Agency: U.S. Army, White Sands Missile Range

Funded Entity: U.S. Geological Survey, New Mexico Water Science Center—Wilcox, Gebhardt, DeWees, and Langman

Title: Investigation of chromium contamination in the upper bolson-fill aquifer of the Tularosa Basin at the High Energy Laser Systems Test Facility, White Sands Missile Range

Funding: \$1,250,000 *Role:* **co-PI** *Dates:* 2000–2005

Funding Agency: U.S. Army, White Sands Missile Range

Funded Entity: U.S. Geological Survey, New Mexico Water Science Center—Langman and Gebhardt *Funding:* \$210,000

Title: Headquarters bolson-fill aquifer, nitrate and wastewater source investigation using noble gases and isotope tracers, White Sands Missile Range

Role: **PI** *Dates:* 2000–2002

University of Texas at El Paso:

Funding Agency: Southwest Consortium for Environmental Research and Policy

Funded Entity: University of Texas at El Paso, Department of Geological Sciences—Ellis, Carney, and Langman

Funding: \$75,000

Title: Potential precipitates of injected desalination wastewater with mixing of deep waters of the Tularosa Basin aquifer

Role: co-PI

Dates: 2006–2008

Environmental Science Associates:

 Funding Agency: City of San Francisco, Planning Department
 Funded Entity: Environmental Science Associates, Water and Environmental Hydrology Market Group— Moulson, Hudson, and Langman
 Funding: \$400,000
 Title: Evaluation of the Peninsula Watershed management plan
 Role: co-PI Dates: 1999-2000

Funding Agency: National Park Service, Yosemite National Park

Funded Entity: Environmental Science Associates, Water and Environmental Hydrology Market Group— Moulson, Hudson, and **Langman**

Funding: \$350,000

Title: Evaluation of the Merced Scenic and Wild River for proposed alteration of river management in Yosemite Valley

Role: **co-PI** *Dates:* 1998–2000

Funding Agency: City of San Leandro

Funded Entity: Environmental Science Associates, Water and Environmental Hydrology Market Group— Hudson and Langman

Funding: \$250,000

Title: San Leandro Shoreline Marshlands Enhancement Project: Wetland and slough dehydration and rehydration during the tidal cycle

Role: **co-PI** *Dates:* 1998–2000

California Polytechnic State University:

Funding Agency: U.S. Environmental Protection Agency, Morro Bay National Monitoring Program *Funded Entity:* California Polytechnic State Univ., Dept. of Natural Resources—Diettrick and Langman *Funding:* \$50,000

Title: Evaluation of nitrogen best management practices for protection of surface water and shallow groundwater quality in the Dairy Creek sub-basin, Morro Bay Watershed

Role: **co-investigator** *Dates:* 1995–1997

Training and Certification

Mine Safety and Health Administration, Part 48 Subpart B Surface Mining, 2024

U.S. Environmental Protection Agency: Field-Based Site Characterization Technologies Training, 2000; Hazardous Waste Operations (HAZWOPER), 2001–2024

U.S. Geological Survey: Water Quality, 2003; Aquatic Chemistry, 2004; Groundwater Geochemistry, 2005

U.S. Forest Service: Wildland Fire Behavior/Basic Firefighter and Incident Command System, 2002

U.S. Army/U.S. Air Force: Unexploded Ordinance Hazards, 2000 and 2003; Range Hazards, 2001 and 2003

Red Cross: First Aid, CPR, and AED, certified 2001, 2004, 2013, 2014

Teaching and Scholarship Workshops

- <u>University of Idaho</u>: Experiential Learning, Managing Classroom Communication and Online Netiquette, An Introduction to Brief Intervention Strategies & Motivational Interviewing, Writing Across the Curriculum Workshop, Successful Proposal Strategies, Best Practices in Graduate Recruitment, Electron Microscopy Summer Workshop
- <u>University of Waterloo:</u> Teaching Philosophy Statements, How Students Learn and Motivating Students, NSERC TERRE-CREATE Analytical Imaging course, Canadian Postdoctoral Scholars Association networking and career development

- <u>American University in Cairo:</u> The Syllabus—Cornerstone for Active Learning, Sailing Through the Copyright Quagmire, The Good and the Bad of Student Group Work, How to Design and Use Rubrics to Evaluate Assignments, Educating Citizens: Preparing Undergraduates for the New Egypt, Making Thinking Visible: Learning and Teaching with Concept/Mind Maps, Flipping the Classroom, Teaching with the iPad, National Research Center and the Holding Company for Water and Wastewater Collaboration Workshop
- <u>University of Texas at El Paso:</u> Curriculum Development and Classroom Communication, Overcoming Statistics Anxiety and Being Successful in Data Analysis, Dissertation Studio, Managing Your Research

Professional Societies

American Geophysical Union, Geochemical Society, National Ground Water Association, Geological Society of America, International Mine Water Association

Equipment and Software Familiarity

- *Mineral/rock analysis equipment:* optical microscopy, XRD, µ-XRD, XRF, laser ablation, SEM, synchrotron radiation and x-ray absorption spectroscopy, carbon/sulfur analyzer, humidity cell experiments
- *Solute analysis equipment:* phase analysis light scattering, gas chromatograph, ion chromatograph, spectrometer, multi-parameter probes, field probes
- *Field hydrologic equipment:* transducers, various dataloggers and transmission platforms, weather stations, current meters, Bennett pumps, Grundfos pumps, bladder pumps, auto samplers
- *Hydrogeology equipment installation, sampling, and analysis:* direct-push drilling/coring (Geoprobe), drilling operations including mud rotary and air hammer for well installation, geophysical logging including density, gamma ray, spontaneous potential, resistivity, sonic, and caliper
- Analytical software: SPLUS, ProStat, PSI-Plot, Veusz, Geochemist's Workbench, PHREEQC, NETPATH, PHAST, AquaChem, AQTESOLV, WELLCAD, Rockworks, Athena, SMAK, Orange, Hydroscape
- *Surface-water measurement:* installed surface water gages and water-chemistry probes, conducted stream reach surveying, developed discharge-height relations, maintained and modified continuous data collection platforms such as GOES data-transmission protocols
- *Groundwater measurement:* extensive steel tape and e-tape use; well development through over-pumping and air surging, installed continuous monitoring probes and associated data collection platforms; performed multi-level sample collection through packer systems utilization; evaluated well logging outputs of caliper, acoustic, resistivity, neutron, and gamma data
- *Meteorological measurement:* installation, maintenance, and data download and processing of a Campbell Scientific meteorological station; data collection, download, and processing of U.S. Navy meteorological stations; use and analysis of data from the NADP and NWS
- Oceanographic data: processed satellite imagery from MODIS and LandSat for thermal and nutrient flux

Leadership and Community Participation

Faculty mentor to Earth Sciences, Environmental Sciences, Water Resources, and Chemical and Materials Engineering undergraduate and graduate students at the University of Idaho, 2015–present Faculty advisor for the Geology Club, University of Idaho, 2016-present

- Associate editor of Mine Water and the Environment; Ad hoc reviewer for Journal of Arid Land, Journal of Environmental Monitoring and Assessment, Journal of Environmental Earth Sciences, Journal of Marine and Petroleum Geology, Atmospheric Research, Chemical Geology, Applied Geochemistry
- Laboratory supervisor, safety officer, student mentor in the Groundwater Geochemistry and Remediation Group in the Department of Earth and Environmental Sciences at the University of Waterloo, 2012–2014
- Project chief of multi-year investigations concerning hydrologic resources in New Mexico for the U.S. Geological Survey, New Mexico Water Science Center, 2002–2011
- Committee Chair for the Young Scientists Poster Awards, International Atomic Energy Agency's International Symposium on Isotopes in Hydrology and Marine Ecosystems, Monaco, 2011
- Invited participant to the U.S. National Academies' Arab-American Science, Engineering, and Medicine Symposium sponsored by the Kuwait Institute for Scientific Research, 2011
- United States Naval Reserve, 2000 to 2007: Aerographer's Mate, 1st Class, Naval Operations Support Centers—USS Boxer and USS Tarawa amphibious support groups, US Fleet Yokosuka support group
- Project chief and technical specialist for multi-office projects and proposal development of water resource evaluations, Environmental Science Associates, 1998–2000
- Field and community outreach coordinator for multi-agency team studying Morro Bay Estuary, California Water Regional Water Quality Control Board and California Polytechnic State University, 1995–1997