

## John E. McCray

Professor & Head, Civil and Environmental Engineering Department  
Colorado School of Mines, Golden, CO 80401-1887  
phone: (303) 273-3490      fax: (303) 273-3413      jmccray@mines.edu  
webpage: <http://cee.mines.edu/faculty/mccray.html>

### ***Professional Preparation***

West Virginia University	Electrical Engineering	B.S. 1986
Clemson University	Environmental Systems Engineering	M.S. 1994
University Arizona	Hydrology & Water Resources	Ph.D. 1998

### ***Appointments***

2011-Present Professor & Head, Civil & Environmental Engineering, Colorado School of Mines  
2010-2011 Professor and Director, Environmental Science and Engineering Division, CSM  
2004-2010 Professor and Director, Hydrologic Science & Engineering Program, CSM  
2004-2008 Associate Professor, Environmental Science & Engineering Division, CSM  
2003-2004 Alexander Deussen Associate Professor, Geological Sciences, Univ. of Texas-Austin  
1998-2003 Assistant Professor, Geology & Geological Engineering, CSM

### ***Advisory Boards, Expert Panels, Expert Advisory Boards***

Executive Committee, NSF Engineering Research Center for Reinventing America's Urban Water Infrastructure (ReNUWI.org) (CSM PI, NSF co-PI, Dick Luthy at Stanford Univ. overall PI)  
U.S. EPA Panel for Financial Responsibility of Geologic Carbon Sequestration, Sole Engineering-Science Technical Expert, 2009.  
U.S. DoE Civilian Radioactive Waste Program, 3-person Expert Panel, Evaluation of hydrologic models used for the Yucca Mountain Waste Repository.  
U.S. DoE National Environmental Technology Laboratory, Expert Panel on Reactive Barriers for Groundwater Remediation.  
ASCE National Ground Water Quality Committee - Chair (2009-2010) and Vice Chair (2007-2008), Yakima Nation, Advisor on Contamination Remediation Issues associated with Hanford Site (via Ridolphi and Associates).  
Idaho National Engineering and Environmental Laboratory (INEEL) Expert Advisor on Vapor Transport in the Deep Vadose Zone  
U.S. DoE, Pacific Northwest National Laboratory (PNNL) – Expert Panel/Advisory Board on DNAPL contamination in vadose zone and groundwater at Hanford Site (via CTC Inc).  
National Science Foundation, Environmental Sustainability Program, Engineering Directorate, Proposal Review Panel, 2006.  
U.S. DoE, Natural and Accelerated Bioremediation Research (NABIR) Proposal Review Panel 2003.  
U.S. DoE National Environmental Technology Laboratory, Groundwater Remediation Proposal Review Panel, 2001.  
City of Denver, expert advisor on development of centralized stormwater reclamation facility and associated water quality credits trading program.  
Northern Alabama communities, expert advisor on environmental transport of perfluorinated compounds (PFCs) (via HWNN)  
Served as Associate Editor for: *Water Resources Research*, *Ground Water*, *J. Contaminant Hydrology*, *Vadose Zone Journal* (*Assoc. Editor of the Year*), *J. AWRA*  
Guest Editor for journal special issues on urban hydrology and urban contaminant hydrology in *Vadose Zone Journal* and *Journal of American Water Resources Association*.  
*Advisor for 53 Graduate students at Mines and UT Austin: 8 current (6PhD, 2 MS); 45 graduated (16 PhD, 29 MS).*

### ***Awards and Recognition***

Rudolph Hering Medal from ASCE's Environmental & Water Resources Institute for top contribution to environmental engineering (paper published in *J. Environ. Engr* Feb 2013).

Fulbright Scholar and Senior Specialist 2013, Water Resources, Universidad de Concepcion, Chile.

Shimizu Visiting Professor of Civil and Environmental Engineering, Stanford University, 2012.

Associate Editor of the Year, Vadose Zone Journal, 2003.

Hydrologic Science and Engineering Graduate Program Faculty Member of the Year, 2013.

Environmental Science & Engineering Best Teacher Award, 2005

### ***Relevant Grants and Awards as Principal Investigator (PI) or co-PI***

*(short list from more than \$20 MM, limited to one page of most recent and most relevant)*

National Science Foundation (NSF), Engineering Research Center (ERC) on Reinventing America's Urban Water Infrastructure (ReNUWIt.org) via Stanford Univ, 8 yrs, \$11 MM including state match (CSM PI, NSF co-PI).

National Science Foundation (NSF), Environmental Sustainability Program, Engineering Urban Streambeds and Stormwater Channel Beds for Improving Stormwater Quality (PI).

National Science Foundation (NSF), Environmental Sustainability Program, Overcoming Barriers for Implementation of Innovative Urban Stormwater Reclamation Technologies (co-PI, PI at Cal Berkeley).

Joint Fire Science Program, Impact of fire on water quality and drinking water supplies in the western U.S., \$385,000, (co-PI).

City and County of Denver, Implementation of an Innovative Centralized Stormwater Reclamation and Use Facility, \$150,000 (in contracting phase) (PI).

U.S. DoD SERDP, Behavior of Perfluoroalkyl Contaminants in Contaminated Groundwater and impacts on remediation of co-contaminants, 3 years, \$675K, (co-PI).

Florida Department of Health via Hazen and Sawyer, Nitrogen Reduction Strategies In Florida - Development of Modeling Tools for Prediction & Decision Making, 5 yrs, \$3MM, (co-PI).

USGS – NIWR, Impacts of mountain pine beetle infestation on water quality and hydrology in Rocky Mountain National Park, 3 years, \$140,000, (PI),.

U.S. EPA-STAR, Risk-Based Decision Making for Assessing Potential Impacts of Geologic CO<sub>2</sub> Sequestration on Drinking-Water Sources, 3 yrs, \$900K, (PI).

National Science Foundation (NSF) RAPID: The 2013 Rim Fire: Survey of Potential Water Quality Impacts on the Hetch Hetchy Reservoir System (co-PI)

ConocoPhillips, WE<sup>2</sup>ST (Water and Energy: Education Science and Technology), Joint Sustainability of Water Resources and Energy in the arid West, \$ 3 MM. Primary author of gift proposal, WE<sup>2</sup>ST Deputy Director.

Modeling cyclodextrin-enhanced in situ chemical ozone oxidation, AFCEE via Enchem, Inc., 2 yrs, \$38,000 (co-PI).

U.S. DoE NETL, Training Graduate and Undergraduate Students in Simulation and Risk Assessment for Carbon Sequestration, 3 years, \$300,000 (PI).

Water Environment Research Foundation, Quantitative Tools for Evaluating Wastewater Treatment in Soil Treatment Units, 3 years, \$1.0MM, (PI).

U.S. DoD SERDP, Chemical and Biological remediation of chlorinated solvents in fractured rock aquifers: 3D intermediate bench-scale studies, 3 years, \$475,000 through Shaw Environmental (CSM PI, DoD co-PI)

WaterReuse Foundation, Role of Retention Time in the Environmental Buffer of Indirect Potable Reuse Projects, 3 years, \$300,000 (co-PI)

U.S. DoE, Geochemical Processes associated with porosity and permeability changes during CO<sub>2</sub> Sequestration, 3 years, \$200,000 (co-PI).

U.S. DoD SERDP, Polymer-enhanced Chemical and Biological Remediation in Heterogeneous Media, 3 years, \$575,000 (PI).

U.S. DoD ETSCP (via Clarkson Univ), Site Demonstration of Polymer-amended In Situ Chemical Oxidation (PA-ISCO) for Enhanced Delivery & In Situ Destruction of Trichloroethylene Contaminant, \$359,000 to Mines, \$1.1MM total (CSM PI, DoD co-PI).

Water Environment Research Foundation, Framework for Decision Making and Risk Evaluation using Watershed Models, 3 years, \$280,000 (PI).

Chevron, Inc., Evaluation of test kits for remote analysis of petroleum hydrocarbons, \$36,000, 3 yrs. (PI).

U.S. DoD ETSCP (via Clarkson Univ), Site Demonstration of Polymer-amended In Situ Chemical Oxidation (PA-ISCO) for Enhanced Delivery & In Situ Destruction of TCE, \$359,000 to Mines, \$1.1MM total (CSM PI, DoD co-PI).

U.S. DoE, Water quality and quantity assessment of the Upper Colorado River for potential oil-shale development, 3 years, \$1.1 MM (co-PI).

Water Environment Research Foundation Onsite Wastewater Source Characterization & Relevance to System Design & Performance, 3 years, \$597,000 (co-PI)

U.S. EPA, NCWRCDP. Modeling Mounding Below Wastewater Infiltration Systems, 2 years, \$75,000.

U.S. DoE, ETSCP via U. Rhode Island. Chemical-Enhanced DNAPL Remediation at U.S. Amphibious Base Virginia Beach, 3 years, \$201,000 to CSM (\$750,000 total), (CSM PI, DoD co-PI).

U.S. EPA, NCWRCDP. Evaluating Wastewater Pollutant Transport from Site to Watershed Scales, Blue River Colorado (co-PI).

U.S. DoED, GAANN, Computational Contaminant Transport – PhD Fellowships, 4 years, \$333,000 (PI).

Colorado Department of Public Health and Environment, Pesticide Vulnerability Model for Colorado, \$95,000 (PI).

ExxonMobil, Modeling Fuel and Solvent Contamination, 3 years, \$45,000 (PI).

U.S. EPA via Cadmus Inc., Evaluation of Evapotranspiration Covers for DoE Landfills, 1 year, \$38,000 (co-PI)

City of Aurora, CO. Transport and treatment of emerging organic pollutants during riverbank filtration, 2 years, \$70,000 (co-PI)

***Peer Reviewed Papers and Book Chapters (abstracts, non-peer reviewed proceedings not presented)***

**Textbooks (1)**

Lee, K., Fetter, C.W., **McCray, J.E.**, 2002. *Hydrogeology Laboratory Manual, 2<sup>nd</sup> Edition*, Prentice Hall, Upper Saddle River, NJ.

**Guest Editorials and Commentary (6)**

**McCray, J.E.**, Anderson, M.P., 2011. Foreword: Lessons Learned About Contaminant Hydrogeology from Legacy Research Sites, *Ground Water*, 49(5), 617–619.

**McCray, J.E.**, Thyne, G.D., 2009. Joint sustainability of water resources and petroleum-energy production, Editorial, *Ground Water*, 47(5), 11.

**McCray, J.E.**, Boving, T.B., 2007. Urban Watershed Hydrology, *J. Amer. Water Resour. Assoc.*, 43(4), 839-840.

**McCray, J.E.**, Christopherson, S.H., 2008. Onsite wastewater systems and interactions with the environment, *ASCE J. Hydrologic Engineering*, 13(8), 653-654.

Boving T.B., and **McCray, J.E.** 2007. Issues in urban hydrology: The emerging field of urban contaminant hydrology, *J. Contaminant Hydrology*, 91 (1-2), 1-3.

**McCray, J.E.**, Thyne, G.D., Boving, T., 2003. Contaminant characterization, transport, and remediation in complex multiphase systems, *Vadose Zone J.*, 2(2), 115.

**Manuscripts in Review or Preparation: (11)**

Herzog, S., Higgins, C.P., **McCray, J.E.**, 2015. Biohydrochemical enhancement structures for stormwater treatment (BEST): Induced hyporheic flow and potential for enhanced contaminant biodegradation, submitted to *ASCE J. Environmental Engineering*.

Bearup, L., Maxwell, R.M., **McCray, J.E.**, 2015. Mixing analysis of hillslope response to land cover change: an integrated model of chemical hydrograph separation, submitted to *Water Resour. Res.*

Cameron, D., Knight, R., Regnery, J., **McCray, J.E.**, 2015. The use of a geostatistical method to characterize flow paths at an aquifer recharge site, submitted to *Ground Water*.

Guelfo, J.L., Wunsch, A., **McCray, J.E.**, Higgins, C.P. 2015. Transport potential of perfluoroalkyl Acids (PFAAs) at AFFF-impacted sites: Column experiments and modeling, submitted to *J. Contam. Hydrol.*

Ruybal, C.J. Digiulio, D.C., Wilkin, R.T., Hargrove, K.D., **McCray, J.E.**, A rapid screening apparatus to detect methane in ground water during purging, in preparation for *Environ. Sci & Technol.*

Shelton, J.L., McIntosh, J.C., Warwick, P.D., **McCray, J.E.**, Comparing crude oil biodegradation to production of microbial methane via formation fluid geochemistry, in preparation for *Applied Geochem.*

Shelton, J.L., Brennan, S.T., Drake, R.M., McIntosh, J.C., Hunt, A.G., Warwick, P.D., **McCray, J.E.**, CO<sub>2</sub> Storage during miscible enhanced oil recovery, in preparation for *Energy Conversion and Management.*

Menke, H., Navarre-Sitchler, A., Lichner, P., Hammond, G., **McCray, J.E.**, 2014. Evaluating storage of geologically sequestered CO<sub>2</sub> using numerical simulations, in preparation for *Internat. J. International Greenhouse Gas Control (IJGGC)*

Deardorff, J., **McCray, J.E.**, 2014. Risk-based screening of CO<sub>2</sub> sequestration potential in saline aquifers, in preparation.

Smith, M., Silva, J.A.K., Marr, J.M., **McCray, J.E.**, 2014 Use of polymers for heterogeneity control and electron donors during bioremediation, in preparation for *Environ. Sci. Technol.*

Christensen, K., Altman, P., Schaefer, C., **McCray, J.E.**, 2014. Chemical oxidation in an experimental fractured sandstone network, in preparation for *J. Civil & Environ. Engr.*

#### **Peer-Reviewed Journal Papers in Print or in Press (76)** (Grad Students and Post Docs underlined)

McKenzie, E.R., Siegrist, R.L., **McCray, J.E.**, Higgins, C.P., 2015. Perfluoroalkyl acid (PFAA) fate and transport in NAPL-contaminated porous media with chemical oxidation remediation, in press

Christensen, K., Altman, P., Schaefer, C., **McCray, J.E.**, 2015. Steady-state DNAPL dissolution in three-dimensional fractured-sandstone network experiments, *J. Environ. Engr.*, 141(1), 04014047, 10.1061/(ASCE)EE.1943-7870.0000871.

Kopytkovskiy, M., Geza, M., **McCray, J.E.**, 2015. Climate-Change impacts on water resources and hydropower potential in the Upper Colorado River Basin, in press *J. Hydrology: Regional Studies.*

Bearup, L.A., Maxwell, R.M., Clow, D.W., **McCray, J.E.**, 2014. Hydrological effects of forest transpiration loss in bark beetle-impacted watersheds, *Nature Climate Change*, 4, 481–486 (2014) doi:10.1038/nclimate2198.

Kirsch, K., Navarre-Sitchler, A.K., Wunsch, A., **McCray, J.E.**, 2014. CO<sub>2</sub>-induced metal release from sandstones: Implications for geologic carbon sequestration, *Environ. Sci. Technol.*, 48 (3), 1436–1442, 10.1021/es403077b.

Bearup, L., Mikkelsen, K., Wiley J., Navarre-Sitchler, A.K., Maxwell, R.M., Sharp, J.O., **McCray, J.E.**, 2014. Metal fate and partitioning in soils under bark beetle-killed trees, *Science of the Total Environment*, 496: 348-357.

Mikkelsen K.M., Bearup L.A., Navarre-Sitchler A.K., **McCray J.E.**, Sharp J.O., 2014, Changes in metal mobility associated with bark-beetle induced tree mortality, *Environ. Science: Processes and Impacts, in press*, DOI: 10.1039/c3em00632h

Roberts, S., Higgins, C.P., **McCray J.E.**, 2014. Sorption of emerging organic wastewater contaminants to four soils, *Water*, 6(4), 1028-1042.

Mikkelsen, K.M., Dickenson, E., **McCray, J.E.**, Maxwell, R.M., and Sharp, J.O., 2013. Water quality impacts from climate-induced forest die-off, *Nature Climate Change*, 3, 218-222.

Lawrence, J.E., Skold, M.E., Hussain, F.A., Silverman, D.R., Resh, V.H., Sedlak, D.L., Luthy, R.G., **McCray, J.E.**, 2013. Hyporheic zone management in urban streams: A review and opportunities for enhancing water quality and improving aquatic habitat by active management, *Environmental Engineering Sci.*, 30(8), 480-501.

Mikkelsen, K., Bearup, L., Maxwell, R., Sharp, J., **McCray, J.E.**, 2013. Bark beetle infestation impacts on nutrient cycling, water quality and the interdependent hydrological effects, *Biogeochemistry*, 115, 1-21.

- Wunsch, A., Navarre-Sitchler, A.K. Moore, J., Ricko, A., **McCray, J.E.**, 2013. Metal release from dolomites at high partial-pressures of CO<sub>2</sub>. *Applied Geochemistry*, 38, 33–47.
- Wunsch, A., Navarre-Sitchler, A.K., Moore, J., **McCray, J.E.**, 2013. Metal release from limestones at high partial-pressures of CO<sub>2</sub>. *Chemical Geology*, 363: 40-55.
- Geza, M., Lowe, K., Huntzinger, D.N., **McCray, J.E.**, 2013. New conceptual model for soil treatment units: formation of multiple hydraulic zones during unsaturated wastewater infiltration, *J. Environ. Qual.*, 42 (4), 1196-1204.
- Geza, M., Lowe, K.S. **McCray, J.E.**, 2013. STUMOD- a tool for predicting fate and transport of nitrogen in soil treatment units, *Environmental Modeling & Assessment*, 19 (3), 243-256.
- Bischel, H.N., J.E. Lawrence, B.J. Halaburka, M.H. Plumlee, A.S. Bawazir, J.P. King, **J.E. McCray**, V.H. Resh, R.G. Luthy, 2013. Renewing urban streams with recycled water for streamflow augmentation: Hydrologic, water quality, and ecosystem services management. *Environ. Engrg Sci.*, 30(8), 455-479.
- Bradshaw, J.K., Radcliffe, D.E., Simunek, J., Wunsch, A., **McCray, J.E.**, 2013. Nitrogen fate and transport in conventional onsite wastewater treatment system installed in a clay soil: a nitrogen chain model, *Vadose Zone J.*, 12(3):10.2136/vzj2012.0150.
- Siegrist R.L., **McCray J.E.**, Lowe K.S., Cath T.Y., Munakata-Marr J., 2013. Onsite and decentralized wastewater systems - Advances from a decade of research and educational efforts. Australian Water Association Journal, *Water*, 40 (1), 77-84.
- Silva, J., Liberatore, M. **McCray, J.E.**, 2013. Characterization of bulk fluid and transport properties for simulating polymer-improved aquifer remediation, *ASCE J. Environ. Engr.*, 139(2), 149-159. *Winner of the Rudolph Hering Medal from ASCE for Best Paper in Environmental Engineering in 2013.*
- Mikkelson K.M., Maxwell R.M., Ferguson, I., Stednick, J., **McCray J.E.**, Sharp J.O., 2013. Mountain pine beetle infestation impacts: modeling water and energy budgets at the hillslope scale, *Ecohydrology* (6), 64–72.
- Wunsch, A., Navarre-Sitchler, A.K. **McCray, J.E.**, 2013. Geochemical implications of brine leakage into freshwater aquifers, *Ground Water*, 51(6), 855-865.
- Bearup, L., Navarre-Sitchler, A., Maxwell, R.M., **McCray, J.E.**, 2012. Kinetic metal release from competing processes in aquifers, *Environ. Sci Technol.*, 46(12), 6539–6547
- Silva, J.A.K., Smith, M.E., Munakata-Marr, J., **McCray, J.E.**, 2012. Effect of system variables on in situ sweep efficiency via viscosity modification, *J. Contaminant Hydrology*, 136-137, 117-130.
- Schaefer, C., Towne, R.M., Root, D., **McCray, J.E.**, 2012. Assessment of chemical oxidation for treatment of DNAPL in fractured sandstone blocks, *J. Environ. Engineering*, 138(1), 1-7, DOI: 10.1061/(ASCE)EE.1943-7870.0000466.
- Siirila, E, Sitchler, A.K., Maxwell, R.M., **McCray, J.E.**, 2012. A quantitative methodology to assess the risks to human health from CO<sub>2</sub> leakage into groundwater, *Adv. Water Resources*, 36(1), 146-164.
- McCray, J.E.**, Tick, G., Jawitz, J.J., Annable, M., Brusseau, M.L., Falta, R., Gierke, J., Knox, R., Sabatini, D., Wood, A.L., 2011. Remediation of NAPL Source Zones: Lessons Learned from Field Studies at Hill and Dover AFB, *Ground Water*, 49(5), 727-744.
- Geza M., Murray, K.E., **McCray J.E.**, 2010. Model evaluation of potential impacts of onsite wastewater systems on phosphorus in Turkey Creek Watershed, *J. Environ. Qual.*, 39(5), 1636-1646.
- Geza M. Murray, K.E., **McCray J.E.** 2010. Watershed scale impacts of nitrogen from onsite wastewater systems: parameter sensitivity and model calibration *ASCE J. Environ. Engineering*, 136 (9), 926-928.
- Geza, M., **McCray, J.E.**, Poeter, E.P. 2009. Quantifying predictive uncertainty for a mountain-watershed model, *J. Hydrology*, 376, 170–181.
- Skold, M.E., Thyne, G.D., **McCray, J.E.**, Drexler, J.W., Macalady, D., 2008. Enhanced solubilization of a metal-organic contaminant mixture (Pb, Sr, Zn, and PCE) by cyclodextrin. *Environ. Sci. Technol.* 42(23), 8930-8934.
- Smith, M M., Silva, J.A.K., Munakata-Marr, J., **McCray, J. E.**, 2008. Compatibility of polymers and chemical

- oxidants for enhanced groundwater remediation. *Environ. Sci. Technol.*, 42 (24) 9296-9301.
- Skold, M., Thyne, G., Drexler, J., **McCray, J.E.**, 2009. Solubility enhancement of seven metal contaminants using carboxymethyl-beta-cyclodextrin (CMCD), *J. Contaminant Hydrol.*, 107(3-4), 108-113.
- Schaeffer, C., E., Callaghan, A.V., King, J., **McCray, J.E.**, 2008. DNAPL morphology and dissolution in discretely fractured sandstone blocks, *Environ. Sci. Technol.*, 43(6), 1877-1883.
- Skold, M.E., Thyne, G.D., Drexler, J.W., **McCray, J.E.** 2008. Determining stability constants for lead complexation by carboxymethyl- $\beta$ -cyclodextrin (CMCD). *J. Contaminant Hydrology*, 93(1-4), 203-215.
- Geza, M., **McCray, J.E.**, 2008. Effects of soil data resolution on SWAT model stream flow and water quality predictions. *J. Environmental Management*, 88, 393-406.
- McCray, J.E.**, Nieber, J., Poeter, E.P., 2008. Ground-water mounding in the vadose zone from onsite wastewater systems: Analytical and numerical tools, *ASCE J. Hydrologic Engineering*, 13(8), 702-709.
- Poeter, E.P., **McCray, J.E.**, 2008. Modeling water-table mounding to design cluster and high-density wastewater soil absorption systems, *ASCE J. Hydrologic Engineering*, 13(8), 710-719.
- Boving, T.B., Blanford, W.J., **McCray, J.E.**, Divine, C.E., Brusseau.M.L., 2008. Comparison of line-drive and push-pull flushing schemes, *Ground Water Monit. Remed.*, 28(1), 75-86.
- Gurdak, J.J., **McCray, J.E.**, Thyne, G.D., Qi, S.L., 2007. Latin-hypercube approach to estimate uncertainty in ground-water vulnerability, *Ground Water*, 45(3), 348-361.
- Heatwole, K.K., **McCray, J.E.**, 2007. Modeling potential vadose-zone transport of nitrogen from onsite wastewater systems at the development scale, *J. Contaminant Hydrology*, 91, (1-2), 184-201.
- Skold, M.E., Thyne, G.D., **McCray, J.E.**, 2007. Using UCODE\_2005 and PHREEQC to determine thermodynamic constants from experimental data, *Ground Water*, 45(3), 368-373.
- Lipson, D.L., **McCray, J.E.**, Thyne, G.D., 2007. Using PHREEQC to simulate solute transport in fractured bedrock, *Ground Water*, 45(4), 468-472.
- Lemons, P.J., **McCray, J.E.**, 2007. Modeling hydrology in a small Rocky Mountain watershed serving large urban populations, *J. Amer. Water Resources Assoc. (JAWRA)*, 43(4), 875-887.
- Gurdak, J.J., Hanson, R.T., McMahon, P.B., Bruce, B.W., **McCray, J.E.**, Thyne, G.D., 2007. Climate variability controls on unsaturated water and chemical movement, High Plains aquifer, United States, *Vadose Zone Journal*, 6, 533-547.
- Bumgarner, J., **McCray, J.E.**, 2007. Estimating biozone hydraulic conductivity in wastewater soil-infiltration systems using inverse numerical modeling, *Water Research*, 41 (11), 2349-2360.
- Boving, T.B., Barnett, S.M., Perez G., Blanford, W.J., **McCray, J.E.**, 2007. Remediation with cyclodextrin: recovery of the remedial agent by membrane filtration, *Remediation J.*, 17(3), 21-36.
- Santi, P., **McCray, J.E.**, Martens, J., 2006. Investigating cross-contamination of aquifers, *Hydrogeology Journal*, 14(1), 51-68.
- Statom, R.A., **McCray, J.E.**, Thyne, G.D., 2006. Conceptual model for landfill hydrologic transport developed using chloride tracer data and dual-domain modeling, *Environmental and Engineering Geosciences*, 12(1), 67-78.
- McCray, J.E.**, Kirkland, S.L., Siegrist, R.L., Thyne, G.D., 2005. Transport-model input parameters for onsite-wastewater nutrients, *Ground Water* 43(4), 628-639.
- Beach, D.N., **McCray, J.E.**, Lowe, K.S., Siegrist, R.L., 2005. Temporal changes in hydraulic conductivity of sand porous-media biofilters during wastewater infiltration: Experimental evaluation, *J. Hydrology*, 311, 230-243.
- Murray, K.E., and **McCray, J.E.**, 2005, Development and application of a regional-scale pesticide transport and groundwater vulnerability model, *Environ. Engrng. Geoscience*, 11(3), 271-284.
- Poeter, E. J. **McCray, J.E.**, Thyne, G., and R. Siegrist, 2005, Designing Cluster and High-Density Wastewater Soil Absorption Systems to Control Groundwater Mounding, *Small Flows Quarterly*, Fall 2005, 7(4), 36-48.

- Divine, C.E., **McCray, J.E.**, 2004. Estimation of membrane diffusion coefficients and equilibration times for LDPE passive diffusion samplers, *Environ. Sci. Technol.*, 38(6); 1849-1857.
- Divine, C.E., McCray, J.E., Boving, T., Blitzer, D., Wolf Martin L., Brusseau, M.L., Blanford, W., 2004. Partitioning tracer tests as remediation metric: Case study at Naval Amphibious Base Little Creek (NABLC), Virginia. *Remediation Journal*, 14(2): 7-31.
- Statom, R., Thyne, G.D., **McCray, J.E.**, 2004. Temporal changes in leachate chemistry of a municipal solid waste landfill cell in Florida, *Environ. Geology*, 45(7), 982-991.
- Siegrist, R.L., **McCray, J.E.**, Lowe, K.S., 2004. Wastewater infiltration into soil and the effects of infiltrative surface architecture. *Small Flows Quarterly Journal*. 5(1):29-39.
- Dugan, P.J., **McCray, J.E.**, Thyne, G.D., 2003. Influence of cyclodextrin on NAPL-water partition coefficients with implications for post-remediation NAPL characterization using partitioning tracer tests, *Water Resources Research*, 39(5), 1.1-1.7.
- Divine, C.E., Sanford, W., **McCray, J.E.**, 2003. Helium and neon tracers to measure residual DNAPL: Laboratory investigation, *Vadose Zone Journal*, 2(3), 382-388.
- Beach, D.N., **McCray, J.E.**, 2003. Numerical modeling of unsaturated flow in wastewater soil absorption systems, *Ground Water Monitoring Remediation*, 23(2), 64-72.
- Darwish, M.I.M., **McCray, J.E.**, Zitha, P.L., Currie, P.K., 2003. Polymer-enhanced DNAPL flushing from low-permeability media: An experimental study, *Ground Water Monitoring Remediation*, 23(2), 92-101.
- Seo, H.S., and **McCray, J.E.** 2002. Interfacial tension of chlorinated aliphatic DNAPL mixtures as a function of organic-phase composition, *Environmental Sci. Technol.* 36 (6), 1292-1298.
- McCray, J.E.**, Dugan, P.J., 2002. Nonideal equilibrium dissolution of trichloroethene from a decane-based NAPL mixture: Experimental and modeling investigation, *Water Resources Res.*, 38(7), 2.1-9.
- Schlosser, S.A., **McCray, J.E.**, Murray, K.E., Austin, B.A., 2002. A subregional-scale method to assess aquifer vulnerability to pesticides, *Ground Water*, 40(4), 361-367.
- Güler, C., Thyne, G.D., **McCray, J.E.**, Turner, A. K., 2002. Evaluation of the graphical and multivariate statistical methods used for classification of water-chemistry data, *Hydrogeology Jour.*, 10(4), 455-474.
- Schlosser, S.A., **McCray, J.E.**, 2002. Sensitivity of a pesticide leaching potential index model to variations in hydrologic and pesticide-transport properties, *Environ. Geosciences*, 9(2), 66-73.
- McCray, J.E.**, Neville, C.J., 2002. Uncertainties associated with using analytical models for soil-vapor-extraction pump-tests, *Acta Universitatis Carolinae Geologica*, 46(2/3), 454-457.
- McCray, J.E.**, Bai, G., Brusseau, M.L., Miller, R., 2001. Biosurfactant-enhanced solubilization of NAPL mixtures, *J. Contam. Hydrol.*, 48(1), 45-68.
- McCray, J.E.**, Boving, T., Brusseau, M., 2000. Enhanced dissolution of hydrophobic organic compounds with implications for aquifer remediation, *Ground Water Monitoring Remed.*, 20(1), 94-103.
- McCray, J.E.**, 2000. Mathematical modeling of air sparging for subsurface remediation: State of the art, *J. Hazardous Materials*, 72(2-3), 237-263, (*invited paper*).
- Cain, R.B., Johnson, G., **McCray, J.E.**, Blanford, W., Brusseau, M.L., 2000. Partitioning tracer tests for evaluating remediation performance, *Ground Water*, 38(5), 752-761.
- Boving, T.B., **McCray, J.E.**, 2000. Cyclodextrin-enhanced remediation of organic and metal contaminants in porous media and groundwater, *Remediation J.*, 10(2), 59-83 (*invited paper*).
- McCray, J.E.**, Brusseau, M.L., 1999. Cyclodextrin-enhanced in situ flushing of multiple-component immiscible organic-liquid contamination at the field scale: Analysis of dissolution behavior, *Environ. Sci. Technol.* 33 (1), 89-95.

**McCray, J.E.**, Brusseau, M.L., 1998. Cyclodextrin-enhanced in-situ flushing of multiple-component immiscible organic-liquid contamination at the field scale: Mass removal effectiveness, *Environ. Sci. Technol.*, 32 (9): 1285-1293.

**McCray, J.E.** and Falta, R.W., 1997. Numerical simulation of air sparging for remediation of NAPL contamination, *Ground Water*, 35(1): 99-110.

**McCray, J.E.** and Falta, R.W., 1996. Defining the air sparging radius of influence for ground water remediation, *J. Contaminant Hydrology*, 24(1): 25-52.

### Peer Reviewed Books or Book Chapters (10)

Siegrist RL, M Crimi, MM Broholm, **JE McCray**, TH Illangasekare, PL Bjerg. 2011. Advances in Groundwater Remediation: Achieving Effective In Situ Delivery of Chemical Oxidants and Amendments. Chapter 15 in: FF Quercia, D Vidojevic (Eds.), *Clean Soil and Safe Water, NATO Science for Peace and Security Series*, Springer Publishing, Dordrecht, The Netherlands. ISBN 978-94-007-2242-2, 299 pp.

**McCray, J.**, M. Geza, K. Lowe, T. Boving, D. Radcliffe, M. Tucholke, A. Wunsch, S. Roberts, J. Amador, J. Atoyan, J. Drewes, D. Kalen, G. Loomis. 2010. Quantitative Tools to Determine the Expected Performance of Wastewater Soil Treatment Units: Guidance Manual. International Water Association Publishing, London, U.K., ISBN: 978-1-84339-395-5/1-84339-395-6.

**McCray, J.**, M. Geza, K. Lowe, T. Boving, D. Radcliffe, M. Tucholke, A. Wunsch, S. Roberts, J. Amador, J. Atoyan, J. Drewes, D. Kalen, G. Loomis. 2010. Quantitative Tools to Determine the Expected Performance of Wastewater Soil Treatment Units: Toolkit User's Guide. International Water Association Publishing, London, U.K., ISBN: 978-1-84339-537-9/1-84339-537-1.

**McCray, J.**, M. Geza, K. Lowe, T. Boving, D. Radcliffe, M. Tucholke, A. Wunsch, S. Roberts, J. Amador, J. Atoyan, J. Drewes, D. Kalen, G. Loomis. 2010. Quantitative Tools to Determine the Expected Performance of Wastewater Soil Treatment Units: Visual-Graphic Tools. International Water Association Publishing, London, U.K., ISBN: 978-1-84339-536-2/1-84339-536-3.

**McCray, J.E.**, Geza M., Murray, K.E., Poeter E.P., Morgan, D.S., 2009. *Modeling Onsite wastewater Systems at the Watershed scale: A User guide*, IWA Publishing, London, U.K. (ISBN 978-1-84339-528-7/1-84339-528-2).

Smith, S.M., Kolm, K.E., Varien, M.D., **McCray, J.E.**, 2008. Emergence and collapse of early villages: Models of central Mesa Verde archaeology, in *Origins of Human Behavior and Culture*, Editors: Kohler, T.A., Varien, M.D., University of California Press, Berkeley CA.

Smith, H.L., **McCray, J.E.**, Thyne, G.D., Lowe, K.S., Bagdol, J., Siegrist, R.L., 2003. Groundwater characterization of the Blue River Watershed, Colorado to assess the potential impacts of anthropogenic pollutants, In: *Engineering Geology in Colorado - Contributions, Trends, and Case Histories*, Association of Engineering Geologists, Denver, CO.

Gurdak, J.J., **McCray, J.E.**, 2005. Groundwater Vulnerability to Pesticides: An Overview of Approaches and Methods of Evaluation, Paper #GW-45, in *The Encyclopedia of Water*, J. H. Lehr (Ed.), John Wiley & Sons, Inc., New York.

**McCray, J.E.**, Bryan, K., Cain, R., Johnson, G., Blanford, B., Brusseau, M., 1999. Field test of cyclodextrin for enhanced in-situ flushing of immiscible organic liquids: Comparison to water flushing, In: *Innovative Subsurface Remediation: Field Testing of Physical, Chemical, and Characterization Technologies*, p.136-152, American Chemical Society, Washington, D.C.

Brusseau, M.L., **McCray, J.E.**, Johnson, G., Wang, X., Wood, A.L., Enfield, C., 1999. Field Test of cyclodextrin for enhanced in-situ flushing of multiple-component immiscible organic liquid contamination: Project overview and initial results, In: *Innovative Subsurface Remediation: Field Testing of Physical, Chemical, and Characterization Technologies*, p. 118-135, American Chemical Society, Wash. D.C.



## Peer Reviewed Conference Proceedings (11)

Geza, M., K. Lowe, C. Tonsberg, **J. McCray**, E. Roeder. 2014. STUMOD-FL - A Tool for Predicting Fate and Transport of Nitrogen in Soil Treatment Units in Florida. Innovation in Soil-Based Onsite Wastewater Treatment Proceedings. SSSA.

Tonsberg, C., M. Geza, K. Lowe, **J. McCray**. 2014. Development of an Analytical Groundwater Model for Fate and Transport of Nitrogen from Onsite Wastewater Systems. Innovation in Soil-Based Onsite Wastewater Treatment Proceedings. SSSA.

Nummedal, D., **McCray, J.E.**, 2013. Making fossil energy more sustainable – Technology pathways and conflict reduction, Proceedings of the Unconventional Resources Technology Conference (URTeC), sponsored by SPE, AAPG, and SEG, Denver, Colorado.

Atchley, A.L., Maxwell, R.M., Navarre-Sitchler, A., Siirila, E.R., and McCray, J.E. 2012. Using streamlines for highly-resolved, reactive transport for CO<sub>2</sub> leakage contamination in groundwater. Proceedings of the conference ModelCARE2011: Models – Repositories of knowledge. IAHS Publ. 3XX, 2012, Leipzig, Germany.

Siegrist, R.L., Crimi, M., Broholm, M.M., **McCray, J.E.**, Illangesekare, T., Bjerg, P., 2011. Advances in groundwater remediation: Achieving effective in situ delivery of chemical oxidants and amendments, Proceedings of the NATO Advanced Research Workshop on Drinking Water Protection by Integrated Management of Contaminated Land, v1, Belgrade, Serbia.

Lindstrom, K.A., **McCray, J.E.**, Thyne, G.D., 2007. Modeling of Phosphorus Reactions during Wastewater Infiltration using Analytical and Numerical Modeling Techniques, *On-site Wastewater Treatment: Proceedings of the 11th National Symposium on Individual and Small Community Sewage Systems*, Amer. Soc. Agricul. Biological Engr., St. Joseph, MI.

Geza M., **McCray, J.E.** 2007. Modeling the Effect of Population Growth on Stream Nutrient Concentration in Turkey Creek Watershed using WARMF Model.. *On-site Wastewater Treatment: Proceedings of the 11th National Symposium on Individual and Small Community Sewage Systems*, Amer. Soc. Agricul. Biological Engr., St. Joseph, MI.

Tucholke, M.B., **McCray, J.E.**, Thyne, G.D., Waskom, R.M., 2007. Correlating denitrification rates to soil texture using hierarchical cluster analysis, *On-site Wastewater Treatment: Proceedings of the 11th National Symposium on Individual and Small Community Sewage Systems*, Amer. Soc. Ag. Bio. Engineers, St. Joseph, MI.

Lemons, P.J., **McCray, J.E.**, 2004. Watershed-Scale Transport Modeling of Onsite Wastewater Pollutants in the Blue River Drainage Basin, In: *On-site Wastewater Treatment: The Tenth National Symposium on Individual and Small Community Sewage Systems*, Amer. Soc. Ag. Engineers Publ., St. Joseph, MI.

Huntzinger, D., **McCray, J.E.**, van Cuyk, S., Siegrist, R.L., 2001. Numerical modeling of unsaturated flow and transport in on-site wastewater treatment systems as affected by soil clogging, *On-site Wastewater Treatment: Proceedings of the 9<sup>th</sup> National Symposium on Individual and Small Community Sewage Systems*, Amer. Soc. Ag. Engineers Publ. 701P0101, St. Joseph, MI.

**McCray, J.E.** and Falta, R.W., 1995. Air sparging for subsurface remediation of dense nonaqueous phase liquids, in: *Amer. Institute Chem. Eng. Sympos. Ser.*, 91 (306): 50-57, AICHE, Wash. D.C.

## Invited Presentations (42)

**McCray, J.E.**, 2014. Reinventing the Nations Urban Water Infrastructure: The Role of Water Reuse. WateReuse Association, Water Reuse Colorado, 2014 Workshop, Panel Discussion on Integrated Water Planning with Laura Belanger, PE, Western Resource Advocates; John McCray, PhD, CSM; Dave Little, Director of Planning, Denver Water; August 2014, Golden CO (invited).

**McCray, J.E.**, 2014. Resiliency of the Nation's Urban Water Infrastructure, Resilience Week 2014, August 2014, Denver CO (invited)

**McCray, J.E.**, Higgins, C.P., Cath, T., 2014. Reinventing the Nation's Urban Water Infrastructure, Opportunities for Municipal Water Utilities, City of Aurora, Aurora Water, April 2014, Aurora CO (invited)

**McCray, J.E.**, Bearup, L.A., Mikkelson, K.M. Maxwell R.M., 2013 Water quality and quantity impacts of the mountain pine beetle infestation in the Rocky Mountain West, Presented at the Fulbright Commission to Chile and the U.S. State Department, Santiago Chile, March 2013 (Invited)

**McCray, J.E.**, Sedlak, DL., Luthy, R.G., 2013. Reinventing the Nation's Urban Water Infrastructure, an overview of the first NSF ERC in Environmental Engineering. Invited presentation to the University of Oklahoma WaTER Center, September 10, 2013.

**McCray J.E.**, Wunsch A, Moore J., Sitchler A, 2013. Hydrochemical Impacts of Carbon Dioxide Leakage in Carbonate Aquifer Materials, invited presentation at 2013 Fall AGU meeting, San Francisco, CA.

Wunsch A, Sitchler A, Moore J., **McCray J.E.**, Geochemical Impacts of Carbon Dioxide Leakage into Carbonate Aquifer Rocks, *Mineralogical Magazine*, 77(5) 2515, invited presentation at the August 2013 Goldschmidt Conference, Florence Italy.

**McCray, J.E.**, 2012. Impact of the mountain pine beetle epidemic on water resources and quality in the Rocky Mountains, Presented at the Environmental Engineering Seminar Series, Department of Civil and Environmental Engineering, University of California Berkeley, 30 November 2012.

**McCray, J.E.**, 2012. Impact of the mountain pine beetle epidemic on hydrology and water quality in the Rocky Mountains, Presented at the Environmental Engineering & Science Seminar Series, Department of Civil & Environmental Engineering, Stanford University, 26 October 2012

**McCray, J.E.**, 2012. Geologic carbon sequestration: Numerical and experimental investigations on leakage and risks to overlying aquifers, Presented at the Environmental Fluids Mechanics and Hydrology Seminar Series, Department of Civil and Environmental Engineering, Stanford University, 29 October 2012 (invited).

**McCray, J.E.**, 2012. Leakage from Geologic Carbon Sequestration: Modeling and Experiments, Invited Seminar, presented to the Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley CA, 26 Sep 2012 (invited)

**McCray, J.E.**, 2012. Geochemical Impacts of Carbon Dioxide Leakage into Carbonate Aquifer Rocks, Presented at the Takashi Asano Seminar Series, Civil & Environmental Engineering Department, University of California Davis, 14 November 2012 (invited).

**McCray, J.E.**, 2012. Geologic carbon sequestration: Experimental and numerical evaluations of risks to freshwater aquifers, Invited Seminar presented at the Department of Geosciences, San Francisco State Univ., 9 October 2012 (invited).

**McCray, J.E.**, Tick, G., Jawitz, J.J., Annable, M., Brusseau, M.L., Falta, R., Gierke, J., Knox, R., Sabatini, D., Wood, A.L., 2012. Remediation of NAPL Source Zones: Lessons Learned from Field Studies at Hill and Dover AFB, *Proceedings of the 2012 National Ground Water Association Summit* (invited).

**McCray J.E.**, Tick, G.R., Bryan, K., Boving, T.B., Johnson, G.R., Brusseau, M.L., 2011. Future directions for the remediation of sites contaminated by Nonaqueous Phase Liquids, Presented at 2011 American Geophysical Union Fall Meeting (Invited).

**McCray, J.E.**, Geza, M., 2011 Model approaches estimating transformation of wastewater pollutants in soil, presented at the Chile Water Center to the Chilean Minister of Agriculture, the Regional Governor, and water professionals, November 2011, Universidad de Concepcion, San Fernando, Chile (invited)

**McCray, J.E.**, Geza, M., Tucholke, M.B., Roberts, S., Boving, T.B., Lowe, K.S, 2011. STUMOD: A relatively simple model for estimating transformation of onsite wastewater pollutants in soil treatment units (STUs), presented at the 2011 Symposium of the Alberta Onsite Wastewater Management Association (AOWMA), Red Deer, Canada (Invited).

Siegrist, R.L., Crimi, M., **McCray, J.E.**, Poulson, M., Bjerg, P., Illangsekare, T., 2011. Advances in groundwater remediation: Achieving effective in situ delivery of chemical oxidants and amendments, NATO Advanced Research Workshop on Drinking Water Protection by Integrated Management of Contaminated Land, 21-23 March 2011, Belgrade, Serbia (Invited).

- Siegrist, R.L., Lowe, K.S., Geza, M., **McCray, J.E.**, 2011. Effluent Dispersal into Soil for Onsite Treatment and Discharge/Reuse: Principles and Practices, Nordic Conference on the State of the Art Concerning Soil Treatment Systems", Sponsored by the Swedish Environmental Protection Agency, 8-9 February 2011, Malmö, Sweden (Invited).
- McCray, J.E.**, Navarre-Sitchler, A.K., Wunsch, Maxwell, R., 2010. Aquifer water quality and geologic carbon sequestration, presented at the Colorado Water Congress, January 28, Denver, CO. (Invited)
- McCray, J.E.**, Navarre-Sitchler, A.K., Maxwell, R.M., 2010. Evaluating the Risk of CO2 Leakage into Shallow Aquifers from Carbon Sequestration, Presented at the Colorado Water Science Day, Joint Conference of USGS and Colorado Water Resources Research Institute, Boulder CO, June 2010. (Invited).
- McCray, J.E.**, 2010. Aquifer Water Quality and Geologic Carbon Sequestration, presented at the 2010 Colorado Water Congress, Denver CO, March 2010 (Invited).
- McCray, J.E.**, 2010. Risk-Based Decision Making for Assessing Potential Impacts of Geologic CO2 Sequestration on Drinking-Water Sources, presented at the DoE/EPA Collaborative Review Meeting, Pittsburgh, PA, Mar 2010 (Invited).
- Christensen, K.E., Altman, P., McCray, J.E., Schaeffer, C.E, 2009. Investigating DNAPL dissolution kinetics in a saturated bench-scale fracture network, Geological Society of America, Abstracts with Programs, 41(7), 696 (Invited).
- Geza M., **McCray, J.E.**, Lowe, K.S., Tucholke, M.B., Wunsch, A., Roberts, S., 2009. A simple tool for predicting nutrient removal in soil treatment units, *Proceedings of the National Onsite Wastewater Recycling Association (NOWRA) 18th Annual Technical Education Conference*, Laurel MD. (Invited).
- McCray, J.E.**, 2009. Simple models to assess mounding on low-permeability layers: uncertainty analysis and risk-based decision making, presented at the Oregon Onsite Wastewater Organization (O2WA) Annual Conference, Oregon State Univ., Corvallis, Or. (Invited).
- McCray, J.E.**, Lowe, K., 2009. Role of onsite wastewater systems in sustainable water use and beneficial reuse, presented at the Oregon Onsite Wastewater Organization (O2WA) Annual Conference, Oregon State Univ., Corvallis, Or. (Invited)
- McCray, J.E.**, 2008. Tools to assessing the performance of soil treatment units for nitrogen, phosphorus, selected emerging organic contaminants, and virus, presented at the Maryland Onsite Wastewater Professionals Association, Talbot County Community Center, Easton, MD, August 26, 2008. (Invited)
- McCray, J.**, Geza, M., Murray, K., 2008. Guide to watershed modeling for assessment of onsite wastewater system impacts, presented at the Maryland Onsite Wastewater Professionals Association, Talbot County Community Center Easton, MD, August 26, 2008. (Invited).
- McCray, J.**, Geza, M., Murray, K., 2008. Watershed-scale assessment for onsite wastewater systems: Model uncertainty analysis, calibration, and risk-based decision making, presented at The 21st Century Watershed Technology: Improving Water Quality and Environment International Conference, Amer. Soc. Agricul. Biological Engineers, March 29-April 3, 2008, University of Concepcion, Chile (Invited).
- McCray, J.**, Geza, M., 2008. Site and watershed scale modeling to assess multiple sources of N pollution, Expert Panel at the Annual National Onsite Wastewater Recycling Association (NOWRA) Conference, Memphis TN (Invited).
- McCray, J.E.**, Oldham, G., Drewes, J., 2006. Investigation of nonequilibrium physical, chemical, and microbiological transport processes for emerging organic contaminants using models and laboratory tracer tests, Geol. Soc. Amer., *Abstracts with Programs*, 38(7). (Invited)
- Smith, S.M., Kolm, K.E., **McCray, J.E.**, 2006. Drought Effects on Prehistoric Settlements: Paleohydrologic Modeling of Spring Discharge, Canyon of the Ancients National Monument, Southwest Colorado; Longmont, CO., Geol. Soc. Amer., *Specialty Meeting, Managing Drought and Water Scarcity in Vulnerable Environments: Creating a Roadmap for Change in the United States (18-20 September)*; *GSA Specialty Meetings Abstracts with Programs*, Abstract No: 109045, ISSN 1556-4800, No. 3. (Invited)

- Lin, H., Bales, R., Gochis, D., Hornbuckle, B., Johnson, B., Krajewski, W., **McCray, J.**, McDonnell, J., Murray, K., Newman, B., Reed, P., Simpkins, B., Thyne, G., Wohl, E., Lall, U., 2005. Soils and the CUAHSI Vision and Beyond, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract H34D-03 (**Invited**)
- McCray, J.**, Poeter, E., Thyne, G., Siegrist, R.L., 2006. Design guidelines to minimize groundwater mounding below high-density onsite wastewater systems, Abstract, Presented at the 9th Annual DOWRA (Delaware Onsite Wastewater Recycling Association) Conference, Harrington Delaware, (**Invited**)
- McCray, J.**, 2006. Groundwater mounding below high-density onsite wastewater systems, Presented at the Annual OOWA (Oregon Onsite Wastewater Association) Conference, Newport Oregon, (**Invited**)
- Heatwole, K.K., **McCray, J.**, 2006. Modeling nitrogen transport and transformation in the vadose zone and aquifers, presented at the University of Minnesota, Statewide Meeting for Onsite Professionals and Regulators (**Invited**).
- McCray, J.**, 2006. Modeling tools to evaluate water-resources pollution from onsite wastewater systems, University of Wyoming, Wyoming Department of Environmental Quality, Statewide Meeting for Onsite Professionals and Regulators (**Invited**).
- McCray, J.E.**, 2005. Evolution of contaminant plumes from multicomponent DNAPL sources, presented at the Annual Meeting of the Colorado Ground Water Association, Denver CO, (**Invited**)
- McCray, J.E.** Lemonds, P.J., 2002. Assessment of the effects of onsite wastewater system effluent on the Dillon Reservoir Watershed, Colorado, using a watershed-scale model (SWAT), Presented at the *Annual Meeting of the Colorado Environmental Health Association*, Vail, CO (**Invited**).
- McCray, J.E.**, Siegrist, R.L., Lowe, K.S., 2002. Science and engineering of onsite wastewater Systems: An overview of research at Colorado School of Mines, *Proceedings of the 4th Southwest On-Site Wastewater Management Conference and Exhibition*, Arizona County Directors of Environmental Health Services Association, Phoenix, AZ (**Invited**).
- McCray, J.E.**, Kirkland S., Siegrist, R.L. van Cuyk, S., Mudd, P.J., 2001. Cumulative effects of wastewater pollutants at the watershed scale, presented at the annual meeting of the Colorado Environmental Health Association, Glenwood Springs, CO (**Invited**).