

JOSEPH N. RYAN

PERSONAL INFORMATION

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EDUCATION

Doctor of Philosophy, 1992, Environmental Engineering, Massachusetts Institute of Technology
Master of Science, 1988, Environmental Engineering, Massachusetts Institute of Technology
Bachelor of Science, 1983, Civil Engineering, Geological Engineering Program, Princeton University

CURRENT POSITION AND AFFILIATIONS

Professor, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, May 2004 to present
Affiliated Faculty, Center of the American West, University of Colorado at Boulder, December 2002 to present
Affiliated Faculty, Environmental Studies Program, College of Arts and Sciences, University of Colorado at Boulder, December 2001 to present
Affiliated Faculty, Cooperative Institute for Research in Environmental Sciences Policy Center, University of Colorado at Boulder, October 2002 to present

PAST POSITIONS

Erskine Fellow, Department of Civil and Natural Resources Engineering, University of Canterbury, Christchurch, New Zealand, July to November, 2008
Director, Environmental Engineering Undergraduate Degree Program, College of Engineering and Applied Science, University of Colorado at Boulder, 2001 to 2006
Associate Professor, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, 2000 to 2004
Visiting Professor, Department of Chemical Engineering, and Visiting Fellow, Yale Institute for Biospheric Studies, Yale University, January to May 2001
Assistant Professor, 1993 to 2000, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder
Postdoctoral Research Associate, 1992 to 1993, U.S. Geological Survey and Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder
Staff Engineer/Geologist, 1983 to 1986, Earth Water and Air, Inc., Minneapolis, Minnesota

AWARDS

Boulder County Pacesetter Award (Science/Health/Medicine), 2008, Boulder *Daily Camera*
National Notable Achievement Award, 2006, U.S. Environmental Protection Agency, Member of the Lefthand Watershed Revitalization Team
Distinguished Achievement Award, 2009, Civil, Environmental, and Architectural Engineering, University of Colorado Boulder
Teaching Award, 2004, 2008, Civil, Environmental, and Architectural Engineering, University of Colorado Boulder

Research Development Award, 2001, Civil, Environmental, and Architectural Engineering, University of Colorado Boulder

Young Researcher Award, 1995, Civil, Environmental, and Architectural Engineering, University of Colorado Boulder

REFEREED JOURNAL ARTICLES

- McCleskey R.B., Nordstrom D.K., Ryan J.N., and Ball J.W., 2011. A new method of calculating electrical conductivity with applications to natural waters. *Geochimica et Cosmochimica Acta*, in press.
- Gerbig C.A., Kim C.S., Stegemeier J.P., Ryan J.N., and Aiken G.R., 2011. Formation of nanocolloidal metacinnabar in mercury-dissolved organic matter-sulfide environmental systems. *Environmental Science and Technology*, dx.doi.org/10.1021/es201837h.
- Writer J.H., Ryan J.N., and Barber L.B., 2011. Role of biofilms in sorptive removal of steroidal hormones and 4-nonylphenol compounds from streams. *Environmental Science and Technology*, in press.
- Writer J.H., Barber L.B., Ryan J.N., and Bradley, P.M., 2011. Attenuation and transformation of steroidal hormones and alkylphenols by stream biofilms. *Environmental Science and Technology*, in press.
- Aiken G.R., Hsu-Kim H., and Ryan J.N., 2011. Influence of dissolved organic matter on the environmental fate of metals, nanoparticles, and colloids. *Environmental Science and Technology* **45**, 3196-3201.
- Nagy K.L., Manceau A., Gasper J.D., Ryan J.N., and Aiken G.R., 2011. Metallothionein-like multinuclear clusters of mercury(II) and sulfur in peat. *Environmental Science and Technology*, in press.
- Deonaraine A., Lau B., Aiken G., Ryan J.N., and Hsu-Kim, 2011. Effects of humic substances on precipitation and aggregation of zinc sulfide nanoparticles. *Environmental Science and Technology* **45**, 3217-3223.
- Mohanram A., Ray C., Metge D.W., Harvey R.W., Barber L.B., Ryan J.N., and Harvey R.W., 2011. Effect of dissolved organic carbon on the transport and attachment behaviors of *Cryptosporidium parvum* oocysts and carboxylate-modified microspheres advected through temperate humic and tropical volcanic agricultural soil. *Environmental Science and Technology*, in press.
- Abudalo R.A., Ryan J.N., Harvey R.W., Metge D.W., and Landkamer L., 2010. Influence of organic matter on the transport of *Cryptosporidium parvum* oocysts in a ferric oxyhydroxide-coated quartz sand saturated porous medium. *Water Research* **44**, 1104-1113.
- Mohanram A., Ray C., Harvey R.W., Metge D.W., Ryan J.N., Chorover J., and Eberl D.D., 2010. Comparison of transport and attachment behaviors of *Cryptosporidium parvum* oocysts and oocyst-sized microspheres being advected through three mineralogically different granular porous media. *Water Research* **44**, 5334-5344.
- Pang L., Nowostawska U., Ryan J.N., Williamson W.M., Walshe G., and Hunter K.A., 2009. Modifying the surface charge of pathogen-sized microspheres for studying pathogen transport in groundwater. *Journal of Environmental Quality* **38**, 2210-2217.
- Harvey R.W., Metge D.W., Shapiro A.M., Renken R.A., Osborn C.L., Ryan J.N., Cunningham K.J., and Landkamer L., 2008. Pathogen and chemical transport in the karst limestone of the Biscayne Aquifer: 3. Use of microspheres to estimate the transport potential of *Cryptosporidium parvum* oocysts. *Water Resources Research* **44**, W08431, doi: 10.1029/2007WR006060.
- Gasper J.D., Aiken G.R., and Ryan J.N., 2007. A critical review of methods used for the measurement of mercury (Hg^{2+})-dissolved organic matter stability constants. *Applied Geochemistry* **22**, 1583-1597.
- Turner N.B., Ryan J.N., and Saiers J.E., 2006. The effect of desorption kinetics on colloid-facilitated transport: Cesium, strontium, and illite colloids. *Water Resources Research* **42**, W12S09, doi:10.1029/2006WR004972.
- Saiers J.E. and Ryan J.N., 2006. Introduction to special section on Colloid Transport in Subsurface Environments. *Water Resources Research* **42**, W12S01, doi:10.1029/2006WR005620.
- Gao B., Saiers J.E., and Ryan J.N., 2006. Pore-scale mechanisms of colloid deposition and mobilization during steady and transient flow through unsaturated granular media. *Water Resources Research* **42**, W01410, doi:10.1029/2005WR004233.
- Abudalo R.A., Bogatsu Y.G., Ryan J.N., Harvey R.W., Metge D.W., and Elimelech M., 2005. The effect of ferric oxyhydroxide grain coatings on the transport of bacteriophage PRD1 and *Cryptosporidium parvum* oocysts in saturated porous media. *Environmental Science & Technology* **39**, 6412-6419.

- Waples J.S., Nagy K.L., Aiken G.R., and Ryan J.N., 2005. Dissolution of cinnabar (HgS) in the presence of natural organic matter. *Geochimica et Cosmochimica Acta* **69**, 1575-1588.
- Saiers, J.E., and Ryan, J.N., 2005. Colloid deposition on non-ideal porous media: The influences of collector shape and roughness on the single-collector efficiency. *Geophysical Research Letters* **32**, L21406, doi:10.1029/2005GL24343.
- Renken R.A., Cunningham K.J., Zygnerski M.R., Wacker M.A., Shapiro A.M., Harvey R.W., Metge D.W., Osborn C.L., and Ryan J.N., 2005. Assessing the vulnerability of a municipal well field to contamination in a karst aquifer. *Environmental & Engineering Geoscience* **11**, 319-331.
- DeNovio N.M., Saiers J.E., and Ryan J.N., 2004. Colloid movement in unsaturated porous media: Recent advances and future directions. *Vadose Zone Journal* **3**, 338-351.
- Keefe S.H., Barber L.B., Runkel R.L., and Ryan J.N., 2004. Fate of volatile organic compounds in a constructed wastewater treatment wetland. *Environmental Science & Technology* **38**, 2209-2216.
- Keefe S.H., Barber L.B., Runkel R.L., Ryan J.N., McKnight D.M., and Wass R., 2004. Conservative and reactive solute transport in constructed wetlands. *Water Resources Research* **40**, doi:10.1029/2003WR002130.
- Harvey R.W. and Ryan J.N., 2004. PRD1 bacteriophage in groundwater viral transport, inactivation, and attachment studies. *FEMS Microbiology Ecology* **49**, 3-16.
- Tufenkji N., Miller G.F., Ryan J.N., Harvey R.W., and Elimelech M., 2004. Transport of *Cryptosporidium* oocysts in porous media: Role of straining and physicochemical filtration. *Environmental Science & Technology* **38**, 5932-5938.
- Gao B., Saiers J.E., and Ryan J.N., 2004. Influence of pH on the deposition and mobilization of clay colloids in unsaturated porous media. *Water Resources Research* **40**, doi:10.1029/2004WR003189.
- Loveland J.P., Bhattacharjee S., Ryan J.N., and Elimelech M., 2003. Colloid transport in a geochemically heterogeneous porous medium: Aquifer tank experiment and modeling. *Journal of Contaminant Hydrology* **65**, 161-182.
- Haitzer M., Aiken G.R., and Ryan J.N., 2003. Binding of mercury(II) to aquatic humic substances: Influence of pH and source of humic substances. *Environmental Science & Technology* **37**, 2436-2441.
- Aiken G.R., Haitzer M., Ryan J.N., and Nagy K., 2003. Interactions between dissolved organic matter and mercury in the Florida Everglades. *Journal de Physique IV* **107**, 29-32.
- Bhattacharjee S., Ryan J.N., and Elimelech M., 2002. Virus transport in physically and geochemically heterogeneous subsurface porous media. *Journal of Contaminant Hydrology* **57**, 161-187.
- Bunn R.A., Magelky R.D., Ryan J.N., and Elimelech M., 2002. Mobilization of natural colloids from an iron oxide-coated sand aquifer: Effect of pH and ionic strength. James J. Morgan Special Commemorative Issue, *Environmental Science & Technology* **36**, 314-322.
- Drexel R.T., Haitzer M., Ryan J.N., Aiken G.R., and Nagy K.L., 2002. Mercury(II) binding to two Florida Everglades peats: Evidence for strong binding and competition with dissolved organic matter released from the peat. *Environmental Science & Technology* **36**, 4058-4064.
- Haitzer M., Aiken G.R., and Ryan J.N., 2002. Binding of mercury(II) to dissolved organic matter: The role of mercury-to-DOM concentration ratio. *Environmental Science & Technology* **36**, 3564-3570.
- Ryan J.N., Harvey R.W., Metge D., Elimelech M., Navigato T.N., and Pieper A.P., 2002. Field and laboratory investigations of inactivation of viruses (PRD1 and MS2) attached to iron oxide-coated quartz sand. *Environmental Science & Technology* **36**, 2403-2413.
- Tufenkji N., Ryan J.N., and Elimelech M., 2002. The promise of bank filtration. *Environmental Science & Technology* **36**, A422-A428.
- Abadzic S.A. and Ryan J.N., 2001. Particle release and permeability reduction in a natural zeolite (clinoptilolite) porous medium. *Environmental Science & Technology* **35**, 4502-4508.
- Sueker J.K., Clow D.W., Ryan J.N., and Jarrett R.D., 2001. Effect of basin physical characteristics on solute fluxes in nine alpine/subalpine basins, Colorado, USA. *Hydrologic Processes* **15**, 2759-2769.
- Sun N., Elimelech M., Sun N.-Z., and Ryan J.N., 2001. A two-dimensional model of colloid transport in physically and geochemically heterogeneous porous media. *Journal of Contaminant Hydrology* **49**, 173-199.
- Sun N., Elimelech M., Sun N.-Z., and Ryan J.N., 2001. Sensitivity analysis and parameter identifiability in colloid transport in geochemically heterogeneous porous media. *Water Resources Research* **37**, 209-222.

- Elimelech M., Nagai M., Ko C.-H., and Ryan J.N., 2000. The relative insignificance of mineral grain zeta potential to colloid transport in geochemically heterogeneous porous media. *Environmental Science & Technology* **34**, 2143-2148.
- Ryan J.N., Elimelech M., Baeseman J.L., and Magelky R.D., 2000. Silica-coated titania and zirconia colloids for subsurface transport field experiments. *Environmental Science & Technology* **34**, 2000-2005.
- Siddiqui M., Amy G., Ryan J., and Oden W., 2000. Membranes for the control of natural organic matter from surface waters. *Water Research* **34**, 3355-3370.
- Sueker J.K., Ryan J.N., Kendall C., and Jarrett R.D., 2000. Determination of hydrologic pathways during snowmelt for alpine/subalpine basins, Rocky Mountain National Park, Colorado. *Water Resources Research* **36**, 63-75.
- Ravichandran M., Aiken G.R., Ryan J.N. and Reddy M.M., 1999. Inhibition of precipitation and aggregation of metacinnabar (mercuric sulfide) by dissolved organic matter isolated from the Florida Everglades. *Environmental Science & Technology* **33**, 1418-1423.
- Ryan J.N., Elimelech M., Ard R.A., Harvey R.W., and Johnson P.R., 1999. Bacteriophage PRD1 and silica colloid transport and recovery in an iron oxide-coated sand aquifer. *Environmental Science & Technology* **33**, 63-73.
- Ravichandran M., Aiken G.R., Reddy M.M., and Ryan J.N., 1998. Enhanced dissolution of cinnabar (mercuric sulfide) by aquatic humic substances. *Environmental Science & Technology* **32**, 3305-3311.
- Ryan J.N., Illangasekare T.H., Litaor M.I., and Shannon R., 1998. Particle and plutonium mobilization in a macroporous soil during rainfall simulations. *Environmental Science & Technology* **32**, 476-482.
- Pieper A.P., Ryan J.N., Amy G.L., Illangasekare T.H., Harvey R.W., and Metge D.W., 1997. Transport of bacteriophage PRD1 through an unconfined sand aquifer: Effect of sewage-derived organic matter. *Environmental Science & Technology* **31**, 1163-1170.
- Edwards M., Benjamin M.M., and Ryan J.N., 1996. Role of organic matter acidity in sorption of natural organic matter (NOM) to oxide surfaces. *Colloids and Surfaces A. Physicochemical and Engineering Aspects* **107**, 297-308.
- Loveland J.P., Ryan J.N., Amy G.L., and Harvey R.W., 1996. The reversibility of virus attachment to mineral surfaces. *Colloids and Surfaces A. Physicochemical and Engineering Aspects* **107**, 205-222.
- Ryan J.N. and Elimelech M., 1996. Colloid mobilization and transport in groundwater. *Colloids and Surfaces A. Physicochemical and Engineering Aspects* **107**, 1-56.
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- Ryan J.N. and Gschwend P.M., 1994. Effect of ionic strength and flow rate on colloid detachment kinetics: Dependence on intersurface potential energy. *Journal of Colloid and Interface Science* **164**, 21-34.
- Backhus D.A., Ryan J.N., Groher D., MacFarlane J.K., and Gschwend P.M., 1993. Sampling colloids and colloid-associated contaminants in ground water. *Ground Water* **31**, 466-479.
- Ryan J.N. and Gschwend P.M., 1992. Effect of iron diagenesis on the transport of clay colloids in an unconfined sand aquifer. *Geochimica et Cosmochimica Acta* **56**, 1507-1522.
- Ryan J.N. and Gschwend P.M., 1991. Extraction of iron oxides from sediments using reductive dissolution by titanium(III). *Clays and Clay Minerals* **39**, 509-518.
- Ryan J.N. and Gschwend P.M., 1990. Groundwater colloids in two Atlantic Coastal Plain aquifers: Field studies. *Water Resources Research* **26**, 307-322.
- Maest A.S., Stallard R.F., Crerar D.A., and Ryan J.N., 1990. Trace metal and nutrient behavior in a polluted estuary with multiple freshwater sources. *Chemical Geology* **81**, 133-149.

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- Ryan J.N., Aiken G.R., Backhus D.A., Villholth K.G., and Hawley C.M., 1999. Investigating the potential for colloid- and organic matter-facilitated transport of polycyclic aromatic hydrocarbons in crude-oil contaminated ground water. In *U.S. Geological Survey Toxic Substances Hydrology Program – Proceedings of the Technical Meeting, Charleston, South Carolina, March 8-12, 1999 – Volume 3 of 3 – Subsurface Contamination from Point Sources* (eds. D.W. Morgenwalp and H.T. Buxton), U.S. Geological Survey Water-Resources Investigation Report 99-4018C, 211-222.

- Ryan J.N., Elimelech M., Ard R.A., and Magelky R.D., 1999. Mobilization and transport of natural and synthetic colloids and a virus in an iron oxide-coated sewage-contaminated aquifer. In *U.S. Geological Survey Toxic Substances Hydrology Program – Proceedings of the Technical Meeting, Charleston, South Carolina, March 8-12, 1999 – Volume 3 of 3 – Subsurface Contamination from Point Sources* (eds. D.W. Morgenwalp and H.T. Buxton), U.S. Geological Survey Water-Resources Investigation Report 99-4018C, 411-422.
- Metge D.W., Navigato T., Larson J.E., Ryan J.N., and Harvey R.W., 1999. Dual-isotope labeling to monitor virus transport and identifying factors affecting viral inactivation in contaminated aquifer sediments from Cape Cod, Massachusetts. In *U.S. Geological Survey Toxic Substances Hydrology Program – Proceedings of the Technical Meeting, Charleston, South Carolina, March 8-12, 1999 – Volume 3 of 3 – Subsurface Contamination from Point Sources* (eds. D.W. Morgenwalp and H.T. Buxton), U.S. Geological Survey Water-Resources Investigation Report 99-4018C, 423-430.
- Ryan J.N., Ard R.A., Magelky R.D., Elimelech M., Sun N., and Sun N.-Z., 1999. Colloid mobilization and transport in contaminant plumes: Field experiments, laboratory experiments, and modeling. U.S. Environmental Protection Agency Report No. EPA/600/S-99/001, 38 pp.
- Yang I.C., Yu P., Rattray G.W., Ferarese J.S., and Ryan J.N., 1998. Hydrochemical investigations in characterizing the unsaturated zone at Yucca Mountain, Nevada. Water-Resources Investigation 98-4132, U.S. Geological Survey, Denver, Colorado, 57 pp.
- Ryan J.N., Mangion S., and Willey D., 1995. Turbidity and Colloid Transport. In *Ground Water Sampling -- A Workshop Summary*, Dallas, Texas, November 30 to December 2, 1993, U.S. Environmental Protection Agency Rep. No. EPA/600/R-94/205, 88-93.
- Backhus D.A., Ryan J.N., Groher D.M., MacFarlane J.K., and Gschwend P.M., 1995. Sampling colloids and colloid-associated contaminants in ground water. In *Ground Water Sampling -- A Workshop Summary*, Dallas, Texas, November 30 to December 2, 1993, U.S. Environmental Protection Agency Rep. No. EPA/600/R-94/205, 21-25.

REPORTS AND REPORT CHAPTERS

- Ryan J.N., Bevan H., Dodge C., and Norvell A., 2009. *Sources of Metal Contamination in the Coal Creek Watershed, Crested Butte, Gunnison County, Colorado: Part III. Early Spring Flow, April 2007*. Report 09-02, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, 49 pp.
- Ryan J.N. and Bevan H., 2009. *Sources of Metal Contamination in the Coal Creek Watershed, Crested Butte, Gunnison County, Colorado: Part II. High Flow, June 2006*. Report 09-01, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, 67 pp.
- Bautts S., Lheritier I., and Ryan J.N., 2006. *Assessment of Metal Contamination of Benthic Macroinvertebrates in the Lefthand Creek Watershed, Northwestern Boulder County, Colorado, 2005*. Report 06-01, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, 78 pp.
- Shanklin B. and Ryan J.N., 2006. *Sources of Metal Contamination in the Coal Creek Watershed, Crested Butte, Gunnison County, Colorado: Part I. Low Flow, September 2005*. Report 06-02, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, 92 pp.
- Limerick P.N., Ryan J.N., Brown T.R., and Comp T.A., 2005. *Cleaning Up Abandoned Hardrock Mines in the West: Prospecting for a Better Future*. Report from the Center #7, Center of the American West, University of Colorado at Boulder, 47 pp.
- Harvey R.W., Shapiro A.M., Renken R.A., Metge D.W., Ryan J.N., Osborn C.L., and Cunningham K.J., 2005. Transport potential of *Cryptosporidium parvum* oocysts in a drinking-water, karstic-limestone aquifer: What we have learned using oocyst-sized microspheres in a 100-m convergent tracer test at Miami's Northwest Well Field. In *U.S. Geological Survey Karst Interest Group Proceedings, Rapid City, South Dakota, September 12-15, 2005*. Scientific Investigations Report 2005-5160, U.S. Geological Survey, Reston, Virginia, 154-155.
- Wood A.R., Cholas R., Harrington L., Isenhardt L., Turner N., and Ryan J.N., 2004. *Characterization and Prioritization of Mining-Related Metal Sources in the Streams and Streambed Sediments of the Lefthand Creek Watershed, Northwestern Boulder County, Colorado*. Report 04-01, Department of Civil,

Environmental, and Architectural Engineering, University of Colorado at Boulder, prepared for the Lefthand Watershed Oversight Group, Niwot, Colorado.

Ryan J.N. and Duren S., 2003. *The Effects of a Forest Road and Off-Road Vehicle Use on the Generation of Suspended Sediment in a Mountain Stream Used for Water Supply*. Report 03-01, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, prepared for the James Creek Watershed Initiative, Jamestown, Colorado.

Ryan J.N., Elimelech M., Harvey R.W., Aronheim J.S., Bhattacharjee S., Bogatsu Y., Loveland J.P., Metge D.W., Navigato T., and Pieper A.P., 2002. Transport of viruses in porous media. In *Colloids and Colloid-Facilitated Transport of Contaminants in Soils and Sediments*, de Jonge L.W., Moldrup P., and Jacobsen O.H., eds., Danish Institute of Agricultural Sciences, Plant Production Report No. 80, Tjele, Denmark, 93-99.

DeNovio, N.M. and Ryan J.N., 2002. Colloid mobilization in simplified soil columns under unsaturated conditions. In *Colloids and Colloid-Facilitated Transport of Contaminants in Soils and Sediments*, de Jonge L.W., Moldrup P., and Jacobsen O.H., eds., Danish Institute of Agricultural Sciences, Plant Production Report No. 80, Tjele, Denmark, 143-148.

CONFERENCE PROCEEDINGS

Ryan J.N. and Edwards M. (editors), 1994. *Critical Issues in Water and Wastewater Treatment*. Proceedings of the 1994 National Environmental Engineering Conference, Boulder, Colorado, July 11-13, American Society of Civil Engineering, New York, 812 pp.

BOOK CHAPTERS

Gerbig C.A., Ryan J.N., and Aiken G.R., in press. The effects of dissolved organic matter on mercury biogeochemistry. In *Environmental Chemistry and Toxicology of Mercury* (Liu G., Cai Y., and O'Driscoll N., eds.), John Wiley and Sons, New York.

Ryan J.N., 2009. Cleaning up abandoned hard-rock mines in the western United States: *Can and will* communities take the lead? In *Remedies for a New West: Healing Landscapes, Histories, and Cultures* (Limerick P.N., Cowell A., and Collinge S.K., eds.), University of Arizona Press, Tucson, Arizona, pp. 173-192.

Elimelech M. and Ryan J.N., 2002. The role of mineral colloids in the facilitated transport of contaminants in saturated porous media. In *Interactions of Soil Particles and Microorganisms and Their Impact on the Terrestrial Environment* (Huang P.M., Bollag, J.-M., and Senesi N., eds.), Vol. 8, IUPAC Series of Analytical and Physical Chemistry of Environmental Systems, John Wiley & Sons, New York, 495-548.

S. Bhattacharjee, M. Elimelech, and J.N. Ryan, 1999. A model for virus transport in heterogeneous porous media. In *Hazardous and Industrial Wastes* (Nikolaidis N., Erkey C., and Smets B.F., eds.), Technomic Publishing, Lancaster, Pennsylvania, pp. 397-406.

Gschwend P.M., Holmén B.A., MacKay A.A., Ryan J.N., Backhus D.A., and Chin Y.-P., 1994. Overview: Processes limiting the occurrence of organic contaminants in moving groundwater. In *Transport and Reactive Processes in Aquifers* (Dracos Th. and Stauffer F., eds.), Balkema, Rotterdam, 11-18.

CONFERENCE PRESENTATIONS AND ABSTRACTS

Craven A., Aiken G.R., and Ryan J.N., 2011. The effect of dissolved organic matter on the release of trace elements from coal ash in natural surface waters. To be presented at the Geological Society of America Meeting, Minneapolis, Minnesota, October 2011.

Mohanty S.K., Ryan J.N., and Saiers J.E., 2011. Mobilization of colloids and metals from intact cores of a fractured soil: Role of pore water exchange. To be presented at the Soil Science Society of America National Meeting, San Antonio, Texas, October 2011.

Dittrich T.M., Ryan J.N., and Saiers J.E., 2011. Role of desorption kinetics on colloid-facilitated transport of cesium and strontium. Presented at the American Chemical Society National Meeting, Denver, Colorado, August 2011.

Webster J.P., Kamark B.L., Ottenfeldt C.F., Ryan J.N., Aiken G.R., Nagy K.L., Nano G., Manceau A., 2011. Changes in the binding of mercury to forest soils following natural and prescribed fire and furnace heating. Presented at the American Chemical Society National Meeting, Denver, Colorado, August 2011.

- Craven A.M., Ryan J.N., and Aiken G.R., 2011. The effect of dissolved organic matter on the release of trace elements from coal ash in natural surface waters. Presented at the American Chemical Society National Meeting, Denver, Colorado, August 2011.
- Writer J.H., Ryan J.N., and Barber L.B., 2011. Fate of 17 β -estradiol and 4-nonylphenol in the Redwood River of Minnesota. Presented at the American Chemical Society National Meeting, Denver, Colorado, August 2011.
- Mohanty S.K., Saiers J.E., and Ryan J.N., 2011. Mobilization of cesium and strontium in a vadose zone by cation exchange, organic matter, and colloids: A laboratory and field study. To be presented at the American Chemical Society National Meeting, Denver, Colorado, August 2011.
- Gerbig C.A., Kim C.S., Stegemeier J.P., Ryan J.N., and Aiken G.R., 2011. The role of DOM, Hg:DOM ratio, sulfide concentration, and kinetics on the formation of metacinnabar-like particles in Hg-DOM-sulfide systems. Presented at the 10th International Conference on Mercury as a Global Pollutant, Halifax, Nova Scotia, Canada, July 2011.
- McCleskey R.B., Nordstrom D.K., and Ryan J.N., 2011. Electrical conductivity method for natural waters. Presented at the Ninth International Symposium on the Geochemistry of the Earth's Surface, Boulder, Colorado, June 2011.
- Writer J.H., Keefe S.K., Ryan J.N., Ferrer I., Thurman M.E., and Barber L.B., 2011. Methods for evaluating in-stream attenuation of trace organic compounds. Presented at the Ninth International Symposium on the Geochemistry of the Earth's Surface, Boulder, Colorado, June 2011.
- Slowey A.J., Gerbig C., Aiken G.R., and Ryan J.N., 2010. Development of an electrochemical surrogate for copper, lead, and zinc bioaccessibility in aquatic sediments. Presented at SERDP Partners in Environmental Technology Technical Symposium & Workshop, November 30-December 2, 2010, Washington, District of Columbia.
- Craven A.M., Maest A.S., and Ryan J.N., 2010. Evaluation of copper-dissolved organic matter binding in surface waters at the proposed Pebble Mine in Alaska. Presented at the Geological Society of America Annual Meeting, Denver, Colorado, November, 2010.
- McCleskey R.B., Nordstrom D.K., and Ryan J.N., 2010. Electrical conductivity: Theory and applications for natural waters. Presented at the Geological Society of America Annual Meeting, Denver, Colorado, November 2010.
- Stewart M.W., Bielefeldt A.R., Mansfield E., Summers R.S., Ryan J.N., 2010. Effects of water quality parameters on the release of silver nanoparticles from a ceramic surface using a quartz crystal microbalance. Presented at the 2010 Water Quality Technology Conference and Exposition of the American Water Works Association, Savannah, Georgia, November 2010, *Proceedings of the 2010 Water Quality Technology Conference and Exposition* (in print).
- Writer J.H., Bradley P.M., Ryan J.N., and Barber L.B., 2010. The role of the epilithon in controlling the fate and transport of endocrine-active compounds in streams. Presented at the American Society of Limnology and Oceanography/North American Benthological Society Meeting, Santa Fe, New Mexico, June 2010.
- Norvell A.S., Ryan J.N., McKnight D.M., and Ren J., 2010. Metal and colloid transport in the hyporheic zone of an acid mine drainage-contaminated stream. Presented at the American Society of Limnology and Oceanography/North American Benthological Society Meeting, Santa Fe, New Mexico, June 2010.
- Conovitz A.R.W. and Ryan J.N., 2010. Collaborative efforts to characterize a watershed impacted by abandoned mines using metal loading tracer dilution tests: A case study for Left Hand Creek watershed, Colorado. Presented at the National Monitor Conference, Denver, Colorado, April 2010.
- Aiken G.R., Nagy K.L., and Ryan J.N., 2010. Challenges in the study of the interactions of metals with dissolved organic matter. Presented at the 239th Meeting of the American Chemical Society, San Francisco, California, March 2010.
- Deonarine A., Lau B., Hsu-Kim H., Aiken G.R., and Ryan J.N., 2010. Growth and aggregation of ZnS nanoparticles during coprecipitation with aquatic humic substances. Presented at the 239th Meeting of the American Chemical Society, San Francisco, California, March 2010.
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- Aiken G.R., Ryan J.N., and Nagy K.L., 2007. Challenges in the study of mercury-dissolved organic matter interactions. Presented at the 2007 American Society of Limnology & Oceanography Aquatic Sciences Meeting, Santa Fe, New Mexico, February 4-9, 2007.
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INVITED LECTURES

- Colorado School of Mines, Department of Chemistry and Geochemistry, November 13, 2009, "Mercury, Sulfur, and Organic Matter: Controls on Mercury(II) Speciation in Water."
- The John Hopkins University, Department of Geography and Environmental Engineering, March 3, 2009, "Microbe Transport in Groundwater: The Role of Physical and Geochemical Heterogeneity."
- University of Colorado at Boulder, Farrand Residential Academic Program, February 5, 2009, "Cleaning Up Abandoned Hard Rock Mines in the American West: Who Will Do It – And How?"
- Lincoln University, Waterwatch Canterbury Programme, Lincoln, New Zealand, November 2008, "Microbe Transport in Groundwater: The Role of Physical and Geochemical Heterogeneity."

Environmental Science and Research, Christchurch, New Zealand, October 2008, "Microbe Transport in Groundwater: The Role of Physical and Geochemical Heterogeneity."

Environmental Science and Research, Christchurch, New Zealand, September 2008, "Mercury, Sulfur, and Organic Matter: Controls on Mercury Speciation and Bioavailability."

University of Canterbury, Department of Civil and Natural Resources Engineering, Christchurch, New Zealand, August 2008, "Assessing the Sources of Metals in a Watershed Affected by Acid Mine Drainage (and Residents Averse to Disturbance of Their Peaceful Mountain Lives!)"

University of Colorado at Boulder, Center for Science and Technology Policy Research, March 2008, "On the Long Road to Jericho: Abandoned Mine Cleanups, the Clean Water Act, and Environmental Good Samaritans."

Rocky Mountain College of Art and Design, Lakewood, Colorado, January 2008, "Science, Research, and the Scientific Method: Extrapolation to Art."

University of Colorado at Boulder, Department of Chemistry and Biochemistry, Environmental and Analytical Chemistry Division, December 2007, "Interactions of Dissolved Organic Matter with Mercury(II): Binding in Solution, Inhibition of Precipitation, and Enhancement of Dissolution."

National Summit of Mining Communities, September 2007, "The water we drink: Effects of acid mine drainage on stream water quality."

National Summit of Mining Communities, September 2007, "The altered environment: An overview of the effects of mining on the air, water, and land."

McGill University, Department of Chemical Engineering, July 2007, "Mercury, Sulfur, and Organic Matter: Controls on Mercury Speciation and Bioavailability."

University of Colorado at Boulder, Hydrologic Sciences Student Research Symposium, March 2007, "Colloids, contaminants, and surface chemistry: Effect of desorption kinetics on the facilitated transport of cesium and strontium by illite colloids."

Duke University, Civil and Environmental Engineering Department, February 2007, "How Organic Matter Affects the Speciation of Mercury in the Florida Everglades, the Sacramento-San Joaquin Delta, and Our Laboratory."

University of Colorado at Boulder, Puksta Scholars Seminar Series, April 2006, "Helping Colorado Communities Dealing With the Legacy of Mining."

University of Colorado at Boulder, Center for Science and Technology Policy Research/Western Water Assessment, February 2006, "Mines, Metals, Western Water Quality, and the Gospel of Luke 10:25-37."

Colorado School of Mines, Environmental Engineering Sciences Division, Golden, Colorado, October 2004, "Hydrologic Sensitivity Training: The Transport of *Cryptosporidium parvum* Oocysts in Karst and Heterogeneous Porous Media."

U.S. Environmental Protection Agency Science to Achieve Results Environmental Research Seminar, Denver, Colorado, May 2004, "Pathogenic Microbe Removal During Riverbank Filtration."

Colorado Riparian Association 16th Annual Conference on Mining and Riparian Areas, Alamosa, Colorado, October, 2003, "Remediation of Abandoned Mines: Can and Will Communities Participate?"

The Reynolds Lecture Series, Colorado Chautauqua Association, Boulder, Colorado, July 2003, "Cleaning Up Waters Polluted by Abandoned Mines: Obstacles and Opportunities."

University of Colorado at Boulder, Center for Science and Technology Policy Research, Brown Bag Seminar Series, March 2003, "Abandoned Mines and Acid Mine Drainage: Achievements and Obstacles in Community-Driven Remediation."

U.S. Environmental Protection Agency, Region 8 Mining Brown Bag Seminar, March 2003, "Abandoned Mines and Acid Mine Drainage: Identification of Metal Sources."

Center of the American West, "Healing the West: Remedy, Repair, Restoration, and Mitigation" Series, Chautauqua Community Hall, Boulder, Colorado, March 2003, "Abandoned Mines and Acid Mine Drainage: Dealing with the Legacy of 'Hit-and-Run' Mining in the West."

International Workshop on Colloids and Colloid-Facilitated Transport of Contaminants in Soils and Sediments, Research Center Foulom, Tjele, Denmark, September 2002, "Virus Transport in Porous Media."

U.S. Environmental Protection Agency, National Center for Environmental Research, STAR Drinking Water Meeting, February 2001, "Attachment and Inactivation During Virus Transport in Groundwater."

Colorado School of Mines, Environmental Engineering Sciences Division, Golden, Colorado, October 1998, "Simulating the Effects of Rainfall on Particle and Plutonium Transport in Rocky Flats Soils."

Ohio State University, Joint Geological Sciences-Civil and Environmental Engineering Seminar Series, Columbus, Ohio, October 1998, "Mobilizing Particles (and Plutonium) in Macroporous Soils during Rainfall Simulations at Rocky Flats, Colorado."

American Chemical Society, Environmental Chemistry Division, Las Vegas, Nevada, September 1997, "Dynamic Light Scattering and Particle Size Distributions in Natural Waters."

American Society of Agronomy Annual Meeting, Indianapolis, Indiana, November 1996, "Role of Particles in Actinide Transport Through Soils during Simulated Rainfall."

Institute for Hydrodynamics and Water Resources, Hørsholm, Denmark, August 1996, "Colloids and Colloid-Facilitated Transport in the Subsurface."

American Chemical Society, 13th Rocky Mountain Regional Meeting, Lakewood, Colorado, June 1996, "Effect of Organic Matter on Virus Transport in a Sewage-Contaminated Aquifer."

International Fine Particles Research Institute, Annual Meeting, University of Illinois, Urbana-Champaign, Illinois, July 1995, "Colloid-Facilitated Transport in Groundwater."

Engineering Foundation Conference, Separation Technology VI: Advances and Opportunities in Environmental Separations, Snowbird, Utah, July 1995, "Role of Colloids in the Distribution of Contaminants in Subsurface Environments."

V.M. Goldschmidt Conference, Pennsylvania State University, University Park, Pennsylvania, May 1995, "Particle Mobilization and Plutonium Transport in Soil during Rainfall Simulations."

Gordon Research Conference, Environmental Sciences – Water, New Hampton, New Hampshire, June 1994, "When Do Colloids Affect Contaminant Transport in Soils?"

Colorado School of Mines, Environmental Engineering Sciences Division, Golden, Colorado, March 1994, "Effects of Solution Chemistry on the Release of Colloids from an Iron Oxide-Coated Sand."

California Institute of Technology, Environmental Engineering and Sciences Division, Pasadena, California, January 1994, "Colloid Release from Surfaces: Dancin' the Two Step."

U.S. Geological Survey, Water Resources Division, Boulder, Colorado, May 1993, "Dissolution of a Natural Ferric Oxyhydroxide Coating on Quartz Grains."

POPULAR PRESS AND MEDIA

"Helping Colorado Communities with Water Quality Problems," August 2008, *Colorado Municipalities*, Natural Resources Issue, Colorado Municipal League (www.cml.org).

"Cleaning Up Abandoned Hard-Rock Mines in the American West," January 2008, interview on "How on Earth" show, KGNU, Boulder, Colorado.

"Abandoned Mines in Boulder County," July 11, 2003, Boulder *Daily Camera*, Opinion page.

CURRENT RESEARCH SUPPORT, EXTERNAL AND INTERNAL

The Effect of Dissolved Organic Matter and Mixing Energy on the Release of Trace Elements from Coal Ash in Natural Surface Waters, Oak Ridge Associated Universities/Tennessee Valley Authority (Cooperative Agreement/Grant 7-22977), May 2010 to April 2012, PI: J.N. Ryan (\$299,874), co-PI: G.R. Aiken, U.S. Geological Survey.

Effects of Fire and Subsequent Sediment Burial on Sulfur and Mercury Binding in Organic Matter of Forest Soils. National Science Foundation, Earth Sciences Division, Geobiology and Low-Temperature Geochemistry (EAR-0952068), August 2010 to July 2013, PI: J.N. Ryan (\$325,395), co-PIs: K.L. Nagy, University of Illinois at Chicago; G.R. Aiken, U.S. Geological Survey; and K. Nydick, Mountain Studies Institute, Silverton, Colorado.

Endocrine-Disrupting Compounds in a Rocky Mountain Stream: Effect of a Major Wastewater Treatment Plant Upgrade, National Science Foundation, Chemical, Bioengineering, Environmental, and Transport Systems Division, Environmental Engineering Program (CBET 0854527), October 2009 to September 2012, PI: J.N. Ryan (\$350,000), co-PIs: L.B. Barber, U.S. Geological Survey, D.O. Norris, University of Colorado at Boulder, A. Vajda, University of Colorado at Denver.

Colloid-Facilitated Transport of Radioactive Cations in the Vadose Zone: Field Experiments at Oak Ridge National Laboratory, Department of Energy, Environmental Science and Management Program (DOE-FG02-08ER64639), August 2008 to July 2011, PI: J.N. Ryan (\$306,486), co-PIs: J.E. Saiers, Yale University, and P.M. Jardine, Oak Ridge National Laboratory.

Mercury Release from Natural Organic Matter (NOM), Minerals, and NOM-Coated Mineral Surfaces, Department of Energy, Environmental Science and Remediation Program (DOE-SC0001766), September 2009 to September 2012, PI: K.L. Nagy, University of Illinois-Chicago, co-PIs: J.N. Ryan (\$304,700) and G.R. Aiken, U.S. Geological Survey.

Development of an Electrochemical Surrogate for Copper, Lead, and Zinc Bioaccessibility in Aquatic Sediments, Department of Defense, Strategic Environmental Research and Development Program, October 2009 to September 2011, PI: A. Slowey, U.S. Geological Survey; co-PIs: J.N. Ryan (\$17,737) and G.R. Aiken, U.S. Geological Survey.

PAST EXTERNAL RESEARCH SUPPORT

The Role of Natural Organic Matter and Mineral Colloids in the Transport of Contaminants through Heterogeneous Vadose Zone Environments, Department of Energy, Environmental Science and Management Program (DE-FG02-06ER64189), February 2006 to January 2010, PI: J.E. Saiers, Yale University, co-PI: J.N. Ryan (\$261,629).

Stream-Sediment Bed Exchange of Colloids and Colloid-Associated Metals in Acid Mine Drainage Environments, National Science Foundation, Earth Sciences Division, Hydrologic Sciences Program (EAR-0538265), August 2006 to July 2010, PI: J.N. Ryan (\$219,365), co-PIs: D.M. McKnight, University of Colorado and J. Ren, Texas A&M University at Kingsville.

Interactions of Mercury and Other Metals with Natural Organic Matter: Binding by Dissolved Organic Matter, Inhibition of Mercuric Sulfide Precipitation, and Enhancement of Mercuric Sulfide Dissolution, National Science Foundation, Earth Sciences Division, Geobiology and Low-Temperature Geochemistry (EAR-0447386), September 2005 to August 2009, PI: J.N. Ryan (\$315,598), co-PIs: K.L. Nagy, University of Illinois at Chicago, and G.R. Aiken, U.S. Geological Survey.

Influences of Flow Transients and Porous Medium Heterogeneity on Colloid-Associated Contaminant Transport in the Vadose Zone, Department of Energy, Environmental Science and Management Program (DE-FG07-02ER63491), September 2002 to August 2006, \$589,996, PI: J.E. Saiers, Yale University (\$359,996), co-PI: J.N. Ryan (\$230,000).

Development of an Electrochemical Surrogate for Copper, Lead, and Zinc Bioaccessibility in Aquatic Sediments, Department of Defense, Strategic Environmental Research and Development Program, October 2009 to September 2011, PI: A. Slowey, U.S. Geological Survey; co-PIs: J.N. Ryan (\$17,737) and G.R. Aiken, U.S. Geological Survey.

Microbial Pathogen Removal During Riverbank Filtration, U.S. Environmental Protection Agency, STAR Program CR-82901001-0), September 2001 to August 2005, \$506,006, PI: J.N. Ryan (\$249,903), co-PIs: M. Elimelech, Yale University (\$256,103) and R.W. Harvey, U.S. Geological Survey.

Collaborative Research: Evaluation of the Effects of Physical and Geochemical Heterogeneity on Virus Transport in Aquifers, National Science Foundation, Small Grant for Exploratory Research (BES-0233183), September 2002 to February 2005, \$99,920, PI: C. Welty, Drexel University (\$50,000), co-PIs: J.N. Ryan (\$49,920) and R.W. Harvey, U.S. Geological Survey.

Microbe Transport in Saturated Filter Sand and Karst Media, U.S. Geological Survey/Colorado Water Resources Research Institute (G-4153-1), September 2002 to November 2004, \$42,857, PI: J.N. Ryan.

Abandoned Mined Land Workshop – A Three-Day Workshop to Examine Successful and Stymied Efforts to Remediate Abandoned Hard Rock Mines that Generate Acid Mine Drainage in the Western United States, U.S. Environmental Protection Agency, Region 8, October 2004, \$12,000, PI: J.N. Ryan and P.N. Limerick (Center of the American West, University of Colorado at Boulder).

Mobilization and Transport of Particles and Particle-Associated Contaminants in the Unsaturated Zone, National Science Foundation, Earth Sciences Division, Hydrologic Sciences Program (EAR-9909553), September 2000 to August 2004, \$252,000, PI: J.N. Ryan.

Locating the Sources of Metals and Acidity in the Lefthand Creek Watershed (Northwestern Boulder County, Colorado), Honeywell International, Inc., April 2003 to July 2004, \$20,000, PI: J.N. Ryan.

Interactions of Mercury with Organic Matter in Water and Soils, National Science Foundation, Environmental Geochemistry and Biogeochemistry Program (EAR-9807735), September 1998 to August 2002, \$250,000, PI: J.N. Ryan (\$250,000), co-PIs: G.R. Aiken, U.S. Geological Survey; K.L. Nagy, University of Colorado.

Virus Attachment, Release, and Inactivation During Groundwater Transport, U.S. Environmental Protection Agency, Exploratory Research (R826179), January 1998 to December 2001, \$372,392, PI: J.N. Ryan (\$196,049), co-PIs: M. Elimelech, University of California at Los Angeles (\$176,343); R.W. Harvey, U.S. Geological Survey, Boulder.

The Role of Organic Matter in the Fate of Mercury in the Florida Everglades, U.S. Geological Survey/Colorado Water Resources Research Institute, September 1998 to June 1999, \$12,901, PI: J.N. Ryan.

Colloid Mobilization and Transport in Contaminant Plumes: Field Experiments and Modeling, U.S. Environmental Protection Agency (CR-824593), October 1995 to September 1997, \$199,800, PI: J.N. Ryan, co-PI: M. Elimelech, University of California, Los Angeles.

The Advance of Colloid Mobilization and Transport Fronts: Intermediate-Scale Experiments, National Science Foundation (EAR-9418472), September 1995 to August 1998, \$188,000, PI: J.N. Ryan (\$100,339), co-PI: M. Elimelech, University of California at Los Angeles (\$87,661).

The Role of Organic Matter in the Fate of Mercury in the Florida Everglades, U.S. Geological Survey/Colorado Water Resources Research Institute (G-2937-1), September 1995 to June 1996, \$71,625, PI: J.N. Ryan.

Novel Approaches to Probing the Mechanism of Brownian Colloid Release from Packed Bed Surface, National Science Foundation, Research Initiation Award (CTS-9410301), September 1994 to August 1998, \$99,971, PI: J.N. Ryan.

Competitive Binding of Polycyclic Aromatic Hydrocarbons (PAHs) by Aqueous Organic Matter, Mineral-Bound Organic Matter, and Mineral Surfaces: Effects on Groundwater Transport of PAHs, National Science Foundation (BES-9307190), May 1994 to April 1997, \$295,000, PI: G.L. Amy (\$147,500), co-PI: J.N. Ryan (\$147,500).

Tracer Experiments in the Vadose Zone at the Rocky Flats Plant Site, EG&G Rocky Flats/U.S. Department of Energy, April 1993 to November 1993, \$58,000, PI: T.H. Illangasekare (\$58,000), co-PIs: M. Nachabe, J.N. Ryan, J. White, M. Williams.

Groundwater Transport of Viruses, National Water Research Institute/U.S. Environmental Protection Agency, December 1992 to December 1994, \$200,000, PI: J.N. Ryan (\$200,000), co-PIs: R.W. Harvey, G.L. Amy, and T.H. Illangasekare.

PAST INTERNAL RESEARCH SUPPORT

Assessing the Extent of Mercury Contamination in the Reservoirs, Lakes, and Streams of Southwestern Colorado: A Collaboration with the Mountain Studies Institute, the Southern Ute Indian Tribe, and the Pine River Watershed Group. University of Colorado at Boulder, Outreach Committee, July 2008 to June 2010, PI: J.N. Ryan (\$16,000).

Investigating the Fate and Transport of Endocrine-Disrupting Chemicals in Natural Waters. Innovative Seed Grant Program, Graduate School, University of Colorado at Boulder, July 2008 to June 2010, PI: J.N. Ryan (\$43,000).

Assessing the Effects of Abandoned Mines on Water Quality in the Coal Creek Watershed, Crested Butte, Colorado. University of Colorado at Boulder, Outreach Committee, September 2005 to August 2008, \$24,000, PI: J.N. Ryan.

Monitoring the Restoration of Lower Lefthand Creek Watershed for the James Creek Watershed Initiative. University of Colorado at Boulder, Outreach Committee, September 2006 to August 2008, \$8,000, PI: J.N. Ryan.

Relating Bioavailability of Metals to Metal Speciation and Colloid Nature and Abundance in Mountain Streams Contaminated by Acid Mine Drainage in Northwestern Boulder County, Colorado, University of Colorado at Boulder, Council on Research and Creative Work, November 2004 to October 2005, \$7,000, PI: J.N. Ryan.

Contributing to the Remediation of Abandoned Mines in the Lefthand Creek Watershed (Northwestern Boulder County, Colorado) with the Lefthand Watershed Oversight Group, University of Colorado at Boulder, Outreach Committee, January 2003 to December 2005, \$24,000, PI: J.N. Ryan.

Assessing the Risk of Mine Wastes in Jamestown, Colorado (Northwestern Boulder County), with the Citizens Advisory Group for the Environment and the James Creek Watershed Initiative, University of Colorado Outreach Committee, January to December 2002, \$5,000, PI: J.N. Ryan.

Investigating the Effects of Off-Road Vehicles on the Macroinvertebrate Population and Water Quality of James Creek with the James Creek Watershed Initiative, University of Colorado Outreach Committee, February 2001 to December 2001, \$4,000, PI: J.N. Ryan.

Assessing the Effects of Off-Road Vehicles on Turbidity in the James Creek Watershed, Northwest Boulder County, Colorado, University of Colorado Outreach Committee, September 1999 to August 2000, \$8,000, PI: J.N. Ryan.

Assessing the Role of Attachment in Virus Inactivation in Groundwater, Grant-in-Aid, Council on Research and Creative Work, University of Colorado, January to December, 1997, \$4,000, PI: J.N. Ryan.

Colloids in Groundwater: Determining the Effects of Pumping Rate on the Suspension of Artificial Colloids During Groundwater Sampling, Grant-in-Aid, Council on Research and Creative Work, University of Colorado, January 1994 to December 1994, \$4,000, PI: J.N. Ryan.

COURSES

CVEN 3454, *Water Chemistry*, undergraduate level, aquatic chemistry with laboratory, once per year

CVEN 5404, *Aquatic Chemistry*, graduate level, aquatic chemistry, 3 semesters

CVEN 4424/5424, *Aquatic Organic Contaminants*, undergraduate and graduate level, once per year

CVEN 5474, *Hazardous Waste Management*, graduate level, 2 semesters

CVEN 5834, *Remediation of Subsurface Contamination*, graduate level, seminar, 1 semester

CVEN 6414, *Aquatic Surfaces and Particles*, graduate level, surface chemistry and colloid chemistry, approximately every other year

EVEN 1000, First-Year Seminar in Environmental Engineering, undergraduate level, one year.

EVEN 4830/ENVS 5100, *Multidisciplinary Perspectives on Abandoned Mine Remediation*, undergraduate and graduate level, abandoned mine remediation designs by student teams, fall 2003, co-taught with Dr. David Stiller

GEEN 1400, *First Year Engineering Projects*, undergraduate level, 3 semesters

ENCH 421 *Industrial Pollution Control*, undergraduate level, Department of Chemical Engineering, University of Canterbury, Christchurch, New Zealand

ENCI 383 *Environmental Engineering 2*, undergraduate level, Department of Civil and Natural Resources Engineering, University of Canterbury, Christchurch, New Zealand

Fate and Transport of Colloids and Colloid-Associated Contaminants in the Subsurface, August 1996 (expenses and honorarium). One-week course and laboratory, Danish Technical University, Lyngby, Denmark, 17 M.S. and Ph.D. students, one semester credit

Colloids, Biocolloids, and Colloid-Facilitated Transport in the Subsurface Environment, E&AS 648b, Yale University, Spring 2001

TEACHING SUPPORT

Outfitting the New Student Water Quality Laboratory with Multimedia Teaching, Microscopy, and Data Acquisition Technology, Engineering Excellence Fund, College of Engineering and Applied Science, University of Colorado, November 2002 to October 2003, \$1,000, PI: J.N. Ryan, co-PIs: Mark Hernandez, Diane McKnight, and Scott Summers.

Outfitting the New Undergraduate Water Quality Laboratory with Multimedia Teaching, Microscopy, and Data Acquisition Technology, Engineering Excellence Fund, College of Engineering and Applied Science,

- University of Colorado, July 2002 to June 2003, \$16,000, PI: J.N. Ryan, co-PIs: Mark Hernandez, Diane McKnight, and Scott Summers.
- Integrating Field Experiences into CVEN 3454 Water Quality Through Short Internships with the James Creek Watershed Initiative, Internship Program, Career Services, University of Colorado, January to December 2001, \$1,000.
- Water Quality Monitoring Equipment for Water Quality (CVEN3454) and Stream Ecology (CVEN 5834) Laboratories, Engineering Excellence Fund, College of Engineering and Applied Science, University of Colorado, July 1998 to June 1999, \$15,994, co-PI: Diane McKnight.
- Water Quality (CVEN 3454) Experiments for Assessing the Mechanisms Controlling the Coagulation of Particles in Water Treatment, Undergraduate Excellence Fund, College of Engineering and Applied Science, University of Colorado, July 1995 to June 1996, \$7,000.
- Water Quality Laboratory (CVEN 3454) Experiments for Understanding the Fate and Transport of Organic Contaminants in Natural Waters, Undergraduate Excellence Fund, College of Engineering and Applied Science, University of Colorado, July 1994 to June 1995, \$17,228.

GRADUATE AND UNDERGRADUATE THESES

- Abadzic D.S., 2002. Probing the Mechanisms of Brownian Colloid Release from Porous Media Surfaces. Ph.D. Thesis. Thesis Committee: Menachem Elimelech, Yale University; Ronald Harvey, U.S. Geological Survey; Mark Hernandez and JoAnn Silverstein, Civil, Environmental, and Architectural Engineering.
- Abe Y., 2003. Transport of *Cryptosporidium parvum* Oocysts in a Geochemically and Physically Heterogeneous Porous Medium. M.S. thesis. Thesis Committee: Subhrendu Gangopadhyay, Civil, Environmental, and Architectural Engineering; Ronald Harvey, U.S. Geological Survey.
- Abu-Dalo R.A., 2006. Evaluation of the Effect of Geochemical and Physical Heterogeneity on *Cryptosporidium parvum* Oocyst Transport in Saturated Porous Media. Ph.D. thesis. Thesis Committee: JoAnn Silverstein and Scott Summers, Civil, Environmental, and Architectural Engineering; Lee Landkamer and Ronald Harvey, U.S. Geological Survey.
- Ard R.A., 1997. Natural and Artificial Colloid Mobilization in a Sewage-Contaminated Aquifer: Field and Laboratory Studies. M.S. Thesis. Thesis Committee: Mark Edwards and Tissa Illangasekare, Civil, Environmental, and Architectural Engineering.
- Aronheim J.S., 1995. Virus Transport in Groundwater: Modeling of Bacteriophage PRD1 Transport through One-Dimensional Columns and a Two-Dimensional Aquifer Tank. M.S. Thesis. Thesis Committee: Ronald Harvey, U.S. Geological Survey; Tissa Illangasekare, Civil, Environmental, and Architectural Engineering.
- Babbington S.P., 2005. Water Quality After Industrial Influence: A Use Attainability Analysis on Lake Calumet in Chicago, Illinois. B.A. Honors Thesis, Environmental Studies Program. Thesis Committee: Dale Miller, Environmental Studies; James White, Geological Sciences.
- Barron M., 2001. The Role of Structural and Chemical Factors in Partitioning of Hydrophobic Organic Compounds to Dissolved Humic Substances and Surfactants. M.S. thesis. Thesis Committee: Gary Amy, Civil, Environmental, and Architectural Engineering; Cary Chiou, U.S. Geological Survey.
- Bautts, S., 2005. An Investigation of Metal Concentrations in Waste Rock Piles, Stream Water, Benthic Macroinvertebrates, and Stream Bed Sediments to Assess Long-term Impacts of Intermittent Precipitation Events in the Lefthand Creek Watershed, Northwestern Boulder County, Colorado. M.S. thesis. Thesis Committee: Diane McKnight and JoAnn Silverstein, Civil, Environmental, and Architectural Engineering.
- DeNovio N.M., 2003. Particle and Particle-Facilitated Contaminant Transport in the Vadose Zone. Ph.D. Thesis. Thesis Committee: Diane McKnight, Balaji Rajagopalan, and Harihar Rajaram, Civil, Environmental, and Architectural Engineering; James Ranville, Colorado School of Mines.
- Drexel R.T., 2000. Mercury(II) Sorption to Two Florida Everglades Peats: Effects of pH, Ionic Strength, Calcium, Chloride, and Dissolved Organic Matter. M.S. Thesis. Thesis Committee: George Aiken, U.S. Geological Survey; Kathryn Nagy, Geological Sciences.
- Duren S.M., 2001. Effect of Off-Road Vehicle Recreation on Benthic Macroinvertebrate Population in James Creek, Northwestern Boulder County, Colorado. B.A. Honors Thesis, Environmental Studies Program.

- Thesis Committee: Diane McKnight, Civil, Environmental, and Architectural Engineering; Mark Williams, Geography and Institute for Alpine and Arctic Research.
- Gasper J.D., 2003. Measurement of Mercury-Dissolved Organic Matter Stability Constants: Three Methods and the Importance of the Detection Window and the Metal Concentration Effect. M.S. thesis. Thesis Committee: George Aiken, U.S. Geological Survey; Kathryn Nagy, Geological Sciences.
- Gilbert H.L., 1999. Evaluation of the Causes and Effects of Turbidity in James Creek, Northwest Boulder County, Colorado. B.A. Honors Thesis, Environmental Studies Program. Thesis Committee: James White, Environmental Studies.
- Green R.C., 1997. Fluorescence Polarization Colloid Charge Titration: Development and Application for Feed Forward Coagulant Control at Water Treatment Plants. M.S. Thesis. Thesis Committee: Gary Amy, Civil, Environmental, and Architectural Engineering; Roger Jordan, Clearcorp, Inc..
- Hawley C.M., 1996. Role of Colloidal Phases in the Removal of Polycyclic Aromatic Hydrocarbons from Aquifer Sediments. M.S. Thesis. Thesis Committee: George Aiken, U.S. Geological Survey; Gary Amy, Civil, Environmental, and Architectural Engineering.
- Hill M., 2010. Effects of Natural Gas Production on Water Quality in Garfield County, Western Colorado. B.S. Honors Thesis, Environmental Studies Program. Thesis Committee: Dale Miller, Environmental Studies; Mark Williams, Geography/Institute for Arctic and Alpine Research.
- Keefe S., 2001. Modeling Fate and Transport of Organic Compounds in a Constructed Wetland. M.S. Thesis. Thesis Committee: Larry Barber II, U.S. Geological Survey; Diane McKnight, Civil, Environmental, and Architectural Engineering.
- Loveland J.P., 1995. Virus Transport in Groundwater: Bacteriophage PRD1 Attachment to Mineral Surfaces. M.S. Thesis. Thesis Committee: Gary Amy, Civil, Environmental, and Architectural Engineering; Ronald Harvey, U.S. Geological Survey.
- McCleskey, R.B., 2010. Electrical Conductivity: Theory and Application for Natural Waters. Ph.D. Thesis. Thesis Committee: James Ball and Kirk Nordstrom, U.S. Geological Survey; Diane McKnight and Scott Summers, Civil, Environmental, and Architectural Engineering.
- Osborn C., 2004. The Effect of Changes in Solution Chemistry on the Attachment of *Cryptosporidium parvum* Oocysts and Microspheres to Limestone and the Transport of *Cryptosporidium parvum* Oocysts and Microspheres in Intact Limestone Cores, M.S. Thesis. Thesis Committee: Ronald Harvey, U.S. Geological Survey; JoAnn Silverstein, Civil, Environmental, and Architectural Engineering.
- Pei Y., 1996. Assessing Water Flow Through the Unsaturated Zone at Yucca Mountain, Nevada, Using Isotopic Tracers. Ph.D. Thesis. Thesis Committee: Tissa Illangasekare and Harihar Rajaram, Civil, Environmental, and Architectural Engineering; James White, Geological Sciences; In Che Yang, U.S. Geological Survey.
- Peirce A.J., 2005. Evaluation of the Effects of Physical and Geochemical Heterogeneity of Virus Transport in Aquifers. M.S. thesis. Thesis Committee: Ronald W. Harvey, U.S. Geological Survey; Lee Landkamer, U.S. Geological Survey; and Harihar Rajaram, Civil, Environmental, and Architectural Engineering.
- Pieper A.P., 1995. Virus Transport in Groundwater: A Natural-Gradient Field Experiment in a Contaminated Sandy Aquifer. M.S. Thesis. Thesis Committee: Gary Amy, Civil, Environmental, and Architectural Engineering; Ronald Harvey, U.S. Geological Survey.
- Ravichandran M., 1999. Interactions Between Mercury and Dissolved Organic Matter in the Florida Everglades. Ph.D. Thesis. Thesis Committee: George Aiken and Michael Reddy, U.S. Geological Survey; Diane McKnight, Civil, Environmental, and Architectural Engineering; Kathryn Nagy, Geological Sciences.
- Shanklin, B., 2006. Sources and Effects of Mining-Related and Natural Acid Rock Drainage Quantified Using Tracer Dilution, Coal Creek Watershed, Gunnison County, Colorado. M.S. Thesis. Thesis Committee: Natalie Mladenov, Institute of Arctic and Alpine Research; JoAnn Silverstein, Civil, Environmental, and Architectural Engineering.
- Sueker J.K., 1996. Isotopic and Chemical Flowpath Separation of Streamflow during Snowmelt and Hydrogeological Controls of Surface-Water Chemistry in Six Alpine-Subalpine Basins, Rocky Mountain National Park, Colorado. Ph.D. Thesis. Thesis Committee: Jill Baron, Colorado State University; Robert Jarrett, U.S. Geological Survey; JoAnn Silverstein, Civil, Environmental, and Architectural Engineering; Mark Williams, Geography and Institute of Arctic and Alpine Research.

- Turner N., 2005. The Effect of Desorption Kinetics on the Colloid-Facilitated Transport of Cesium-137 and Strontium-90 in a Saturated Quartz Porous Medium. M.S. Thesis. Thesis Committee: Hari Rajaram, Civil, Environmental, and Architectural Engineering.
- Wood A.R., 2004. Characterization and Prioritization of Mining-Related Metal Sources with Metal Loading Tracer Dilution Tests, and a Review of Regulations and Mine Restoration Funding Resources, Lefthand Creek Watershed, Northwestern Boulder County, Colorado. M.S. Thesis, Environmental Studies Program. Thesis Committee: Jason Neff, Geological Sciences; Victor Ketellaper, U.S. Environmental Protection Agency.
- Writer, J.H., 2010. Effect of the Epilithon on Removal Processes That Govern Steroidal Hormone and Alkylphenol Fate and Transport in Surface Waters. Ph.D. Thesis. Thesis Committee: Larry Barber, U.S. Geological Survey; Diane McKnight and Scott Summers, Civil, Environmental, and Architectural Engineering; Alan Vajda, University of Colorado Denver.
- Craven, A., Ph.D. thesis in progress (Department of Chemistry and Biochemistry). Role of organic matter in the formation of mercuric sulfide clusters, nanocolloids, and precipitates.
- Dittrich, T., Ph.D. thesis in progress. Effect of soil heterogeneity on the facilitated transport of cesium and strontium.
- Gerbig, C., Ph.D. thesis in progress. Speciation of mercury in the presence of dissolved organic matter and sulfide.
- Mohanty, S., Ph.D. thesis in progress. Effect of rainfall on transport of metals with organic matter in unsaturated soils.
- Norvell, A., Ph.D. thesis in progress. Transport of metals and colloids in the hyporheic zone of an acid mine drainage-affected stream.
- Webster, J. Ph.D. thesis in progress. Effect of fire on the transport of mercury in forest soils.

STUDENT AWARDS

- Jackson Webster, National Park Service George Melendez Wright Climate Change Fellowship (\$20,000), May 2011.
- Sanjay Mohanty, Rich Herbert Memorial Scholarship, American Water Resources Association, Colorado Section (\$1,500), September 2008.
- Christopher Dodge, First Place for Environmental Research, Discovery Learning Apprentice Symposium, College of Engineering and Applied Science, University of Colorado at Boulder, April 2008.
- Sanjay Mohanty, Beverly Sears Graduate Research Award, Graduate School, University of Colorado at Boulder (\$1,000), April 2008.
- Hallie Bevan, First Place for Environmental Research, Discovery Learning Apprentice Symposium, College of Engineering and Applied Science, University of Colorado at Boulder, April 2007.
- Hallie Bevan, Provost Award for Achievement, University of Colorado at Boulder (\$1,000), 2006.
- Ned Turner, Graduate Assistantships in Areas of National Need, Department of Education (stipend and tuition), 2003-2005.
- Alice Wood, Ohana Scholarship, University of Colorado (full tuition, two semesters), 2003-2004.
- Nicole DeNovio, Geological Society of America Research Grant (\$2,765 research funds), cited for "exceptional merit in conception and presentation," Geological Society of America, 2003.
- Sabre Duren, Undergraduate Research Opportunity Award (\$1,200 research funds), University of Colorado, 2001.
- Hanna Gilbert, Undergraduate Research Opportunity Award (\$1,000 research funds), University of Colorado, 1999.
- Mahalingam Ravichandran, Graduate Student Paper Award, American Chemical Society, Environmental Chemistry Division, 1998.
- Mahalingam Ravichandran, Outstanding Student Paper Award, American Geophysical Union, Hydrology Section, Spring Meeting, 1998.

Jonathan P. Loveland, Allen Fellowship (\$3,000), Department of Civil, Environmental, and Architectural Engineering, University of Colorado, 1998.
Jonathan P. Loveland, Graduate Assistantship in Areas of National Needs Fellowship (full stipend and tuition), Department of Education, 1997.
Christine M. Hawley, Graduate Assistantship in Areas of National Needs Fellowship (full stipend and tuition), Department of Education, 1995.
Christine M. Hawley, Allen Fellowship (\$3,000), Department of Civil, Environmental, and Architectural Engineering, University of Colorado, 1995.
Julie K. Sueker, Horton Hydrology Research Grant (\$10,000 research funds), American Geophysical Union, 1995.

OUTREACH SERVICE

Board Member, Boulder Creek Watershed Initiative, September 2007-2010.
Board Member, Colorado Riparian Association, 2005-2008.
Member, Colorado Non-Point Source Council Mining Sub-Committee, Division of Reclamation, Mining, and Safety, Department of Natural Resources, State of Colorado, 2002-2007.
Technical Advisor, *Hardrock Revision*, Colorado Art Ranch, Lake City, Colorado, 2011-present.
Technical Advisor, Lefthand Watershed Oversight Group, Boulder County, Colorado, 2002-present.
Technical Advisor, Coal Creek Watershed Coalition, Crested Butte, Colorado, 2005-2010.
Member, Stream Restoration Team, James Creek Watershed Initiative, 2002-2009.
Member, Colorado Nonpoint Source Council, 2004-2005.
Member, Turbidity Study Advisory Group, James Creek Watershed Initiative, 2000-2002.
Field Sampling Supervisor, National Association of Black Environmentalists, Denver, Colorado, 1999-2000.

PROFESSIONAL ACTIVITIES

Member

Association of Environmental Engineering and Science Professors, 1993 to present
Publications Committee, 2001 to 2002
Chair, Graduate Register Subcommittee, 2001 to 2002
Newsletter Editor, 2009-present
American Geophysical Union, Hydrology Section, 1988 to present
Groundwater Committee, 1998 to 1999
Water Quality Committee, 2000 to 2001
American Chemical Society, Environmental Chemistry Division, 1990 to present

Journal Review

Guest Editor, *Environmental Science and Technology*, Special Issue on Nanoparticles, Metals, and Dissolved Organic Matter, September 2010-January 2011.
Associate Editor, *Water Resources Research*, 2004-2008.
Guest Editor, *Water Resources Research*, special section on "Colloid Transport in Subsurface Environments," March 2005-September 2006.
Guest Editor, *Environmental Science & Technology*, Commemorative Issue for Charles R. O'Melia, December 2004-June 2005.
Reviewer, *Applied Geochemistry*, *American Mineralogist*, *Clays and Clay Minerals*, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, *Colloids and Surfaces B: Biointerfaces*, *Environmental Science & Technology*, *Geoderma*, *Geomicrobiology Journal*, *Journal of Colloid and Interface Science*, *Journal of Contaminant Hydrology*, *Journal of Environmental Engineering ASCE*, *Journal of Environmental Quality*, *Journal of Geotechnical Engineering ASCE*, *Journal of Hydrology*, *Langmuir*, *New Zealand Journal of Marine and Freshwater Research*, *Separation and Purification Methods*, *Soil Science Society of America Journal*, *Water Research*, *Water Resources Research*

Proposal Reviews

Cooperative Institute for Coastal and Estuarine Environmental Technology, University of New Hampshire
Marsden Fund, New Zealand
National Science Foundation
Engineering Directorate, Bioengineering and Environmental Systems Program
Geosciences Directorate, Hydrologic Sciences Program
Biocomplexity in the Environment Program
Environmental Geochemistry and Biogeochemistry Program
International Program
Ohio Sea Grant College Program
Swiss National Science Foundation
University of Illinois Institute for Environmental Studies
University of Wisconsin Sea Grant Institute/University of Wisconsin Water Resources Institute
U.S. Environmental Protection Agency
U.S. Geological Survey Water Resources Research Grants

Panel Reviews

U.S. Department of Energy, Environmental Management and Science Program, 2010
National Science Foundation, Environmental Engineering Program, 2010
U.S. Department of Energy, Environmental Management and Science Program, 2002
National Science Foundation, Environmental Geochemistry and Biogeochemistry Program, 1997
U.S. Department of Energy, Environmental Management Program, 1997
Texas Higher Education Coordinating Board, 1995

Organizer

Nano- to Field-Scale Processes Governing the Transport of Microbes and Colloids in the Subsurface, Geological Society of America Annual Meeting, October 2005, with William P. Johnson, University of Utah.

Cleaning Up Abandoned Hard Rock Mines in the West: Prospecting for a Better Future, a Center of the American West Workshop, October 21-23, 2004, with Prof. Patricia Nelson Limerick, University of Colorado at Boulder.

Water Quality of Hydrologic Systems, American Geophysical Union Spring 2000 Meeting, May 2000, with Aaron Packman, Drexel University.

Transport of Microorganisms in the Subsurface Environment, Special Session, American Geophysical Union Fall 1999 Meeting, December 1999, with Ronald W. Harvey, U.S. Geological Survey.

Transport of Microorganisms and Abiotic Colloids through Saturated Subsurface Materials, Special Session, American Geophysical Union Fall Meeting, December 1997, with Ronald W. Harvey, U.S. Geological Survey.

Use of Field Experiments for Assessing Microbiological and Chemical Processes in Aquifers, Special Session, American Geophysical Union Fall Meeting, December 1995, with Ronald W. Harvey, U.S. Geological Survey.

Moderator

Interfacial Processes in the Water Environment, American Chemical Society 75th Colloid and Surface Science Symposium, Carnegie Mellon University, Pittsburgh, Pennsylvania, June 2001.

Virus Inactivation, International Symposium on Subsurface Microbiology, American Society of Microbiology, Vail, Colorado, August 1999.

Colloidal and Interfacial Phenomena in Aquatic Environments, 209th National Meeting, American Chemical Society, Anaheim, California, April 1995.

Physical-Chemical Processes Controlling Contaminant Mobility in Aquatic Environments, 207th National Meeting, American Chemical Society, Anaheim, California, March 1994.

Groundwater Sampling Workshop, U.S. Environmental Protection Agency, Dallas, Texas, November 1993.

External Thesis Committee Member

Charlotte Kjærgaard, Ph.D., Department of Environmental Engineering, Institute of Life Sciences, Aalborg University, Aalborg, Denmark, October 2003.

Tonya Bird, Ph.D., Department of Chemical Engineering, Yale University, New Haven, Connecticut, April 2007.