

ENVIRONMENTAL SCIENCES DIVISION  
OAK RIDGE NATIONAL LABORATORY  
P.O. BOX 2008  
OAK RIDGE, TENNESSEE 37831-6038  
(865) 691-8426 (Home)  
(865) 574-8058 (Work)  
(865) 576-8646 FAX  
Email: [jardinepm@ornl.gov](mailto:jardinepm@ornl.gov)  
<http://www.esd.ornl.gov/people/jardine/index.html>

**PERSONAL INFORMATION:**

Home Address: 2209 Misty Trace  
Knoxville, TN 37919

Born: November 13, 1959  
Happily Married, 2 wild/wonderful children

**PROFESSIONAL OBJECTIVE:**

To develop advanced teaching and research programs that strongly integrate the chemical, physical, and microbiological aspects of subsurface media. My current interests focus on the experimental and theoretical aspects of subsurface solute and contaminant transport at multiple scales.

**EDUCATION:**

Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Ph.D. Soil Chemistry/Physics GPA 3.76, March 1983 - December 1985.

University of Delaware, Newark, Delaware. M.S. Soil Chemistry GPA 3.80, June 1981 - February 1983.

University of Delaware, Newark, Delaware. B.S. Soil Chemistry and minor in Chemistry. GPA 3.50. Degree with Distinction and Cum Laude. September 1977 - June 1981.

**EXPERIENCE:**

Soil Chemist/Physicist; Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, Tennessee (10/86 to present) Hired by Robert R. Luxmoore. Present title: Distinguished Research Staff Scientist

Research topics:

Influence of coupled physical, chemical, and microbial processes on the fate and transport of contaminants in soil and rock systems.

Quantifying time-dependent transport mechanisms that control contaminant migration in fractured and porous subsurface media at both the laboratory and field scales.

Subsurface transport model validation and uncertainty analysis in heterogeneous field soils.

Experimental and theoretical aspects of contaminant and co-contaminant transport in undisturbed, variably unsaturated soils.

Influence of soil physical and geochemical properties on toxic metal bioaccessibility.

Significance of contaminant co-transport in soils via inorganic and organic colloids.

Hydrogeochemical factors controlling the transport and sequestration of dissolved organic carbon and solutes in soil.

Teaching Experience: Frequent guest lecturer for the University of Tennessee in the classes "Advanced Soil Physics" and "Field and Laboratory Methods in Hydrogeology".

Adjunct Professor, Department of Geological Sciences, University of Tennessee.

Post Doctoral Research Associate; Department of Agronomy, Virginia Polytechnic Institute and State University, Blacksburg, Virginia (12/85 to 10/86) (employer: Lucian L. Zelazny).

Research topics:

Speciation of complex inorganic and organic aluminum solutions through differential kinetic reactions with ferron.

Teaching experience: Instructor of selected topics in the graduate classes entitled "Advanced Soil Chemistry" and "Soil Physical and Colloidal Chemistry".

Graduate Research Assistant (Ph.D.); Department of Agronomy, Virginia Polytechnic Institute and State University, Blacksburg, Virginia (3/83 to 12/85) (Major Professors. Drs. Lucian Zelazny and Jack Parker)

Research topics:

Speciation of inorganic aluminum solutions and modeling their kinetics and mechanisms of adsorption on selected solids.

Effects of multisite ion selectivity and adsorption kinetics on heterovalent cation transport in soil.

Teaching experience: Instructed undergraduate soils laboratory for two quarters during Ph.D. studies.

Graduate Research Assistant (M.S.); Department of Plant and Soil Science, University of Delaware, Newark, Delaware (6/81 to 2/83) (Major Professor Dr. Donald L. Sparks).

Research topics:

Kinetics and thermodynamics of K-Ca exchange on clays and soils.

Independent Undergraduate Research, Department of Plant and Soil Science, University of Delaware, Newark, Delaware (9/80 to 6/81) (Major Professor Dr. Donald L. Sparks).

Research topic:

Kinetic and thermodynamic analysis of K reactions in soils as affected by Al, Ca, and Mg.

Independent Undergraduate Research, Department of Chemistry, University of Delaware, Newark, Delaware (11/79 to 6/80).

Research topic:

Mechanisms of inactivation of the enzyme Acyl-CoA dehydrogenase using active-site specific reagents.

## **HONORS:**

**Highly Cited Researchers** in Environmental Studies, The Institute for Scientific Information, (ISI), 2003.

Soil Science **Research Award**, Soil Science Society of America, 1998.

One of three finalists in the category of Scientific and/or Technological Development for The **Outstanding Young Persons in the World** Program (TOYP), International Junior Chamber of Commerce, 1998.

**Ten Outstanding Young Americans**, United States Junior Chamber of Commerce, 1998.

Presidential Citation for **Outstanding Achievement**, University of Delaware, 1997.

**Presidential Early Career Award** for Scientist and Engineers, The President of the United States of America (William Clinton), Washington, D.C., 1996.

**Young Independent Scientist Award**, Department of Energy, Office of Energy Research, 1996

Oak Ridge National Laboratory **Research and Development Accomplishment Award**, ORNL, 1995

**Scientific Achievement Award**, Environmental Sciences Division, ORNL, 1993

Sigma Xi **Research award**, Virginia Tech, 1987.

Potash and Phosphate Institute **fellowship award**. University of Delaware, 1982.

Undergraduate **degree with distinction and cum laude**. University of Delaware, 1981.

Sigma Xi **outstanding undergraduate research award**. University of Delaware, 1981.

American Society of Agronomy **outstanding undergraduate award**. University of Delaware, 1981.

## **PUBLICATION AWARDS**

**Best Presentation**, Division S-7 of the Soil Sci. Soc. Am. 2003. “**J. R. Tarver**, J. A. Palmer, D. E. Todd, and P. M. Jardine. 2003. Fate and Transport of Dissolved Organic Carbon in Soils from two Contrasting Watersheds. Soil Science Society of America, Nov. 2-6, 2003. Denver, CO”.

**Award of Excellence**, Society for Technical Communication / East Tennessee Chapter 2000. Publication: **Brooks, S.C.**, S.L. Carroll, and P.M. Jardine. 1999. Sustained bacterial reduction of Co(III)EDTA<sup>-</sup> in the presence of competing geochemical oxidation during dynamic flow. Environ. Sci. Technol. 33:3002-3011.

**Award of Excellence**, Society for Technical Communication / East Tennessee Chapter 2000. Publication: **Jardine, P.M.**, S.E. Fendorf, M.A. Mayes, I.L. Larsen, S.C. Brooks, and W.B. Bailey. 1999. Fate and transport of hexavalent chromium in undisturbed heterogeneous soil. Environ. Sci. Technol. 33:2939-2944.

**Award of Achievement**, Society for Technical Communication / East Tennessee Chapter 1997. Publication: **Brooks, S.C.**, D.L. Taylor, and P.M. Jardine. 1996. Reactive transport of EDTA-complexed cobalt in the presence of ferrihydrite. Geochimica et Cosmochimica Acta. 60:1899-1908.

## **GENERAL REVIEW ACTIVITIES:**

Review ~ 5 papers per year for Soil Science Society of America, Water Resources Research, Journal of Environmental Quality, Geoderma, J. Hydrologic Processes, Geochimica et Cosmochimica Acta, Environmental Science and Technology, Nature and other publications.

Review several research proposals and reports each year for U.S. Environmental Protection Agency, U.S. Department of Agriculture, National Science Foundation, and U.S. Department of Energy.

## **PROFESSIONAL ACTIVITIES:**

Chairman, division S-11 of the Soil Science Society of America 1996-1997.

Chair-Elect, division S-11 of the Soil Science Society of America 1995-1996.

Adjunct Professor, Department of Geological Sciences, University of Tennessee, 1996-present.

Associate Editor Soil Science Society America Journal 1991-1995.

Associate Editor Vadose Zone Journal 2001-2003.

Paper Recycling Coordinator for Oak Ridge National Laboratory 1990-1993. This program was voluntarily developed and initiated by myself and two other staff members and serves over 4000 employees. Responsibilities turned over to the Division of Waste Management, ORNL in 1993.

Toner Cartridge and paper recycling representative for the Environmental Sciences Division, ORNL 1994-present.

#### **PREVIOUS RESEARCH GRANTS AND CONTRACTS:**

"Subsurface transport model validation and minimum parameter requirements in heterogeneous field soils" (principal investigator with G.V. Wilson), DOE Subsurface Science Program, 5/89 - 9/92, \$425,000.

"Soil-water-waste interactions: controls on contaminant release and transport" (principal investigator with G.K. Jacobs) DOE Subsurface Science Program, 5/89 - 9/92, \$395,000.

"Experiments with natural organics" (co-principal investigator with J.F. McCarthy) DOE Subsurface Science Program, 6/87 - 5/94, \$400,000/y.

"Spatial Heterogeneity of Subsurface Microbial, Chemical, and Physical Processes" (co- investigator with A.V. Palumbo) DOE Subsurface Science Program, 1994, \$300,000.

"Characterization and microbial utilization of organic carbon" (co- principal investigator with J.F. McCarthy) DOE Deep Subsurface Subprogram, 10/90 - 5/94, \$150,000/y.

"Field-scale validation of a three-dimensional multispecies hydrogeochemical transport model" (principal investigator) DOE Subsurface Science Program, 10/91 - 10/94, \$450,000.

"Co-Contaminant transport in subsurface media" (principal investigator) DOE Subsurface Science Program, 10/92-10/94, \$320,000.

"Quantifying the diffusive mass transfer of tritium within secondary source regimes at WAG 5" (principal investigator) Energy Systems Environmental Restoration Program, 10/92-10/94, \$380,000/y.

"Quantifying mass transfer kinetics within secondary source regimes using undisturbed subsurface columns" (principal investigator) Energy Systems Environmental Restoration Program, 10/92-10/94, \$180,000/y.

"Chemical and microbial controls on co-contaminant fate and transport" (principal investigator) DOE Subsurface Science Program, 10/94 \$300,000/y, 10/95-present \$350,000/y.

"Fracture Flow and Matrix Diffusion at Laboratory and Field Scales" (principal investigator) Groundwater Operable Units, Energy Systems Environmental Restoration Program, 10/94-10/95, \$293,000.

"Measurement of Oxide-Mineral Reduction Using X-ray Absorption Spectroscopy" (principal investigator with S.C. Brooks) Seed Money Fund, Laboratory Directed Research and Development Program, 1996, \$103,000.

"A Parallel Computer Model and Integrated Visualization System for Assessing the Migration of Industrial Mixed Waste Plumes: Development and Field-Scale Applications" (principal investigator with J.P. Gwo) Environmental Technology Partnership Initiative, 1996, \$386,000.

"Containment of toxic metals and radionuclides in porous and fractured media: Optimizing biogeochemical reduction versus geochemical oxidation". (principal investigator with S.C. Brooks) Environmental Management Science Program, 1996-1999, \$450,000/y for 3 y.

"Influence of Coupled Processes on the Fate and Transport of Industrial Mixed Waste Plumes in Structured Media". (principal investigator with J.P. Gwo) Environmental Technology Partnership Initiative, 1997-2000, \$500,000/y for 3y.

"Behavior of Dense, Immiscible Solvents in Fractured Clay-rich Soils". (principal investigator with L.D. McKay) Environmental Management Science Program, 1996-1999, \$200,000/y for 3 y.

"Microbiological Controls on the Fate and Transport of Chelated Radionuclides: Multiscale Investigations in Unsaturated Structured Media" (principal investigator with S.C. Brooks) DOE Natural and Accelerated Bioremediation Program, 1997-2000, \$450,000/y for 3 y.

"Fate and Transport of Radionuclides Beneath the Hanford Tank Farms: Unraveling Coupled Geochemical and Hydrological Processes in the Vadose Zone" (principal investigator) U.S. Dept. of Energy, Environmental Management Science Program, FY00-FY02, \$425,000/y for 3y.

"Fate and Transport of <sup>90</sup>Sr Beneath the Hanford Tank Farms" (principal investigator) U.S. Department of Energy, Hanford Environmental Management program, FY00-FY02. 150,000/y.

"Quantifying the Bioavailability of Toxic Metals in Soils" (principal investigator with M.O. Barnett and S.E. Fendorf) U.S. Dept. of Defense SERDP program, FY00 - FY04, \$1,350,000.

"Proposal for a NABIR Field Research Center on the Oak Ridge Reservation, Tennessee" DOE Natural and Accelerated Bioremediation Program, FY00-open, \$1,600,000/y (contributing investigator).

"Field-scale evaluation of biostimulation for remediation of uranium-contaminated groundwater at a proposed NABIR Field Research Center in Oak Ridge, Tennessee" (principal investigator with C.S. Criddle) DOE Natural and Accelerated Bioremediation Program, 2001-2004. \$5,000,000.

"Microbially mediated immobilization of contaminants through in situ biostimulation" (principal investigator with S.C. Brooks and S.E. Fendorf) U.S. Dept. of Energy, Environmental Management Science Program, 2001-2003. \$1,200,000.

## **CURRENT RESEARCH GRANTS AND CONTRACTS:**

“**Science Advisor** for the NABIR Field Research Center on the Oak Ridge Reservation, Tennessee” DOE Natural and Accelerated Bioremediation Program, FY02 - open, \$70,000/y (principal investigator).

“Center for Research on Enhancing **Carbon Sequestration** in Terrestrial Ecosystems. A joint effort among ORNL, PNNL, and ANL. DOE Climate Change Technology Initiative: Establishment of Centers for Research on Carbon Sequestration in Terrestrial Biosphere and the Ocean.” FY00-open, \$2,500,000/y (principal investigator with many others).

“Enriched Background Isotope Study (EBIS): Litter reciprocal transplant studies to understand sources, transport and **fate of carbon in soils** and watersheds” (principal investigator with many others) DOE Carbon Sequestration Research Program, 2001-2005. \$3,000,000.

“Decreasing Toxic **Metal Bioavailability** with Novel Soil Amendment Strategies” (principal investigator with M.O. Barnett and S.E. Fenforf). U.S. Dept. of Defense SERDP program, FY03 - FY05, \$1,500,000.

“Coupled Hydrological and Geochemical Processes Governing the **Fate and Transport of Radionuclides** and Toxic Metals in the Hanford Vadose Zone” (principal investigator with M.A. Mayes and S.E. Fendorf) U.S. Dept. of Energy, Environmental Management Science Program, FY03-FY05, \$325,000/y for 3y.

“Microbially Mediated Immobilization of Contaminants Through **In Situ Biostimulation**: Recompete of EMSP ERKP602” (principal investigator). U.S. Dept. of Energy, Environmental Management Science Program, FY04-FY06, \$484,000.

“Elucidating Bioreductive Transformations within Physically Complex Media: Impact on the **Fate and Transport of Uranium and Chromium**” (co-principal investigator with S.E. Fendorf). DOE Natural and Accelerated Bioremediation Program, FY04 - FY06, ORNL portion \$130,000/y for 3 y.

“**Field-scale evaluation** of strategies to prevent remobilization of biologically reduced uranium deposits” (principal investigator with C.S. Criddle) DOE Natural and Accelerated Bioremediation Program, 2004-2007. \$1,000,000/y.

“The Effect of Soil Properties on Decreasing **Toxic metal Bioavailability**: Field Scale Validation to Support Regulatory Acceptance” (principal investigator). Department of Defense, Environmental Security Technology Certification Program (ESTCP). 2005-2007. \$1,300,000.

“Hydrological and Geochemical Controls on the **Fate and Transport of Cr(VI), U, and CoEDTA** in Undisturbed Sediments from the Hanford 200E Area” (with Mayes as PI). Ch2m HILL Hanford Group, Inc. \$150K FY04 to carryover to FY05 (awarded); \$300k FY05 (pending); \$300k FY06 (pending).

“**Monitoring the Influence of Remedial Capping** on the Hydrological, Geochemical, and Microbial Processes that Control Subsurface Contaminant Migration at WAG 5 on the Oak Ridge Reservation: Implications Toward Long-Term Stewardship” U.S. Dept. of Energy, Environmental Management Science Program. FY05-06 \$330,000

## **PENDING:**

“Experimental and Numerical Analysis of **Scale-dependent Subsurface Transport Processes**” (with Parker, Yeh, Gwo, and Watson). U.S. Dept. of Energy, Environmental Management Science Program.

“Quantifying **Scale-dependent Hydrological and Geochemical Processes** Governing the Fate and Transport of Radionuclides and Toxic Metals in the Hanford Vadose Zone” (with Mayes, Perfect, Gwo, and Fendorf). U.S. Dept. of Energy, Environmental Management Science Program.

“**Monitoring the Influence of Remedial Capping** on the Hydrological, Geochemical, and Microbial Processes that Control Subsurface Contaminant Migration at WAG 5 on the Oak Ridge Reservation: Implications Toward Long-Term Stewardship” U.S. Dept. of Energy, Environmental Management Science Program (seeking additional FY06 – FY08 funding).

"**Enhancing soil organic carbon protection** for long-term sequestration: Increasing the passive organic carbon pool" (principal investigator with C. Rice) DOE Carbon Sequestration Research Program.

## **PUBLISHED MANUSCRIPTS: (total >130)**

Sparks, D.L., and P.M. Jardine. 1981. Thermodynamics of potassium exchange in soil using a kinetic approach. *Soil Sci. Soc. Am. J.* 45:1094-1099.

Jardine, P.M., and D.L. Sparks. 1984. Potassium-calcium exchange in a multireactive soil system: I. Kinetics. *Soil Sci. Soc. Am. J.* 48:39-45.

Jardine, P.M., and D.L. Sparks. 1984. Potassium-calcium exchange in a multireactive soil system: Thermodynamics. *Soil Sci. Soc. Am. J.* 48:45-50.

Sparks, D.L., and P.M. Jardine. 1984. Comparison of kinetic equations to describe potassium-calcium exchange in pure and in mixed systems. *Soil Sci.* 138:115-122.

Jardine, P.M., L.W. Zelazny, and J.C. Parker. 1985. Mechanisms of Al adsorption on clay minerals and peat. *Soil Sci. Soc. Am. J.* 49:862-867.

Jardine, P.M., J.C. Parker, and L.W. Zelazny. 1985. Kinetics and mechanisms of Al adsorption on kaolinite using a two site nonequilibrium transport model. *Soil Sci. Soc. Am. J.* 49:876-873.

Parker, J.C., and P.M. Jardine. 1986. Effects of heterogeneous adsorption behavior on ion transport. *Water Resour. Res.* 22:1334-1340.

Jardine, P.M., L.W. Zelazny, and A. Evans Jr. 1986. Solution aluminum anomalies resulting from various filtering materials. *Soil Sci. Am. J.* 50:891-894.

Jardine, P.M., and L.W. Zelazny. 1986. Mononuclear and polynuclear aluminum speciation through differential kinetic reactions with ferron. *Soil Sci. Soc. Am. J.* 50:895-900.

- Zelazny, L.W., and P.M. Jardine. 1987. Surface reactions of aqueous aluminum species. p. 147-184. (In) G. Sposito (ed.). The environmental chemistry of aluminum. CRC Press.
- Jardine, P.M. and L.W. Zelazny. 1987. Influence of organic anions on the speciation of mononuclear and polynuclear aluminum by ferron. *Soil Sci. Soc. Am. J.* 51:885-889.
- Jardine, P.M., and L.W. Zelazny. 1987. Influence of inorganic anions on the speciation of mononuclear and polynuclear aluminum by ferron. *Soil Sci. Soc. Am. J.* 51:889-892.
- Jardine, P.M., G.V. Wilson, and R.J. Luxmoore. 1988. Modeling the transport of inorganic ions through undisturbed soil columns from two contrasting watersheds. *Soil Sci. Soc. Am. J.* 52:1252-1259.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.R. Jones. Scaling of hydrologic properties for simulation of watershed drainage. Intern. Conf. Validation of Flow and Transport Models for the Unsaturated Zone: Conference Proceeding; May 23-26. Ruidoso, New Mexico State Univ., Las Cruces, N.M. pp. 531-538
- Jardine, P.M., G.V. Wilson, R.J. Luxmoore, and J.F. McCarthy. 1989. Transport of inorganic and natural organic tracers through an isolated pedon in the field. *Soil Sci. Soc. Am. J.* 53:317-323.
- Jardine, P.M., and L.W. Zelazny. 1989. A speciation method for partitioning mononuclear and polynuclear aluminum using ferron. p. 19-40. (In) T.E. Lewis (ed.) *The Environmental Chemistry and Toxicology of Aluminum*. Lewis Publishers.
- Wilson, G.V., J.M. Alfonsi, and P.M. Jardine. 1989. Spatial variability of subsoil hydraulic properties of two forested watersheds. *Soil Sci. Soc. Am. J.* 53:679-685.
- Jardine, P.M. N.L. Weber, J.F. McCarthy. 1989. Mechanisms of dissolved organic carbon adsorption by soil. *Soil Sci. Soc. Am. J.* 53:1378-1385.
- Jardine, P.M., G.V. Wilson, and R.J. Luxmoore. 1990. Unsaturated solute transport through a forest soil during rain events. *Geoderma.* 46:103-118.
- Luxmoore, R.J., P.M. Jardine, G.V. Wilson, J.R. Jones, and L.W. Zelazny. 1990. Physical and chemical controls of preferred path flow through a forested hillslope. *Geoderma.* 46:139-154.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.R. Jones. 1990. Hydrology of a forested watershed during storm events. *Geoderma.* 46:119-138.
- Jardine, P.M., G.V. Wilson, J.F. McCarthy, R.J. Luxmoore, and D.L. Taylor. 1990. Hydrogeochemical processes controlling the transport of dissolved organic carbon through a forested hillslope. *J. Contaminant Hydrology.* 6:3-19.
- Jardine, P.M. 1990. Modeling nonequilibrium reactions of inorganic solutes in soil columns. (In) *Rates of Soil Chemical Processes.* (ed.) D.L. Sparks and D.L. Suarez. *Soil Sci. Soc. Am. special pub. no. 27* p 255-279.

- Luxmoore, R.J., G.V. Wilson, P.M. Jardine, and R.H. Gardner. 1990. Use of percolation theory and latin hypercube sampling in field-scale solute transport investigations. Proc. First Intern. Symposium on Forest Soils. p. 437-439. Harbin, China, July 22-27.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, L.W. Zelazny, D.A. Lietzke, and D.E. Todd. 1991. Hydrogeochemical processes controlling subsurface transport from an upper subcatchment of Walker Branch watershed during storm events: 1. Hydrologic transport processes. *J. Hydrology*. 123:297-316.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, L.W. Zelazny, D.E. Todd, and D.A. Lietzke. 1991. Hydrogeochemical processes controlling subsurface transport from an upper subcatchment of Walker Branch watershed during storm events: 2. Solute transport processes. *J. Hydrology*. 123:317-336.
- Mulholland, P.J., G.V. Wilson, and P.M. Jardine. 1990. Hydrogeochemical response of a forested watershed: Effects of preferential flow along shallow and deep pathways. *Water Resour. Res.* 26:3021-3036.
- Palumbo, A.V., V. Zaidi, P.M. Jardine, J.F. McCarthy. 1990. Bioavailability and characterization of organic matter in deep subsurface environments. First Symposium on Deep Subsurface Microbiology, Orlando, Florida. Chapter 2 p. 57-68
- Dunnivant, F.M., P.M. Jardine, D.L. Taylor, and J.F. McCarthy. 1992. Co-transport of cadmium and hexachlorobiphenyl by dissolved organic carbon through columns containing aquifer material. *Environ. Sci. Technol.* 26:360-368.
- Dunnivant, F.M., P.M. Jardine, D.L. Taylor, and J.F. McCarthy. 1992. Transport of naturally occurring dissolved organic carbon in laboratory columns containing aquifer material. *Soil Sci. Soc. Am. J.* 56:437-444.
- Jardine, P.M., F.M. Dunnivant, H.M. Selim, and J.F. McCarthy. 1992. Comparison of models for describing the transport of dissolved organic carbon in aquifer columns. *Soil Sci. Soc. Am. J.* 56:393-401.
- Jardine, P.M. and G.K. Jacobs. 1991. Unsaturated transport of inorganic cations in undisturbed soil columns. J.A. Canepa, Comp., "Proceedings of the DOE Yucca Mountain Site Characterization Project Radionuclide Adsorption Workshop at LANL, September 11-12, 1990". LANL report LA12323-C.
- O'Dell, J.D., J.D. Wolt, and P.M. Jardine. 1992. Transport of Imazethapyr in undisturbed soil columns as related to persistence in soil solution. *Soil Sci. Soc. Am. J.* 56:1711-1715.
- Wilson, G.V., P.M. Jardine, J.D. O'Dell, and M. Collineau. 1993. Field-scale transport from a buried line source in unsaturated soil. *J. Hydrology* 145:83-109.
- Saiers, J.E., J.F. McCarthy, P.M. Jardine, L. Liang, and G.M. Hornberger. 1993. Transport of amorphous TiO<sub>2</sub> through homogeneous and structurally heterogeneous porous media. (In) J.F. McCarthy and F.J. Wobber (eds.) Concepts for manipulating groundwater colloids for environmental restoration, Chelsea MI: Lewis Publishers Inc. pp. 309-313.

- Wilson, G.V., P.M. Jardine, J.P. Gwo. 1992. Modeling the hydraulic properties of a multi-region soil. *Soil Sci. Soc. Am. J.* 56:1731-1737.
- McCarthy, J.F., L. Liang, P.M. Jardine, and T.M. Williams. 1993. Mobility of natural organic matter injected into a sandy aquifer. (In) *Manipulation of groundwater for environmental restoration*, Lewis Publ., Boca Raton, FL. pp. 35-40.
- Jardine, P.M., G.K. Jacobs, and G.V. Wilson. 1993. Unsaturated transport processes in undisturbed heterogeneous porous media. I. Inorganic Contaminants. *Soil Sci. Soc. Am. J.* 57:945-953.
- Jardine, P.M., G.K. Jacobs, and J.D. O'Dell. 1993. Unsaturated transport processes in undisturbed heterogeneous porous media II. Co-Contaminants. *Soil Sci. Soc. Am. J.* 57:954-962.
- McCarthy, J.F., T.M. Williams, L. Liang, P.M. Jardine, A.V. Palumbo, L.W. Cooper, L.W. Jolley, and D.L. Taylor. 1993. Mobility of natural organic matter in a sandy aquifer. *Environ. Sci. Technol.* 27:667-676.
- Gwo, J.P., P.M. Jardine, G.V. Wilson, and G.T. Yeh. 1994. Modeling small-scale physical non-equilibrium and large-scale preferential fluid and solute transport in a structured soil. X International Conference on Computation Methods in Water Resources, July 19-22, 1994, Heidelberg, Germany.
- Jardine, P.M. and D.L. Taylor. 1995. Fate and Transport of Ethylenediaminetetraacetate Chelated Contaminants in Subsurface Environments. In D.L. Sparks (ed.) *Soil Environmental Chemistry*. Elsevier Science Publishers, The Netherlands (*Geoderma* 67:125-140).
- Gwo, J.P., P.M. Jardine, G.V. Wilson, and G.T. Yeh. 1995. A multiple-pore-region concept to modeling mass transfer in subsurface media. *J. Hydrol.* 164:217-237.
- Jardine, P.M. and L.W. Zelazny. 1996. Surface reactions of aqueous aluminum species. (In) G. Sposito (ed.) *The Environmental Chemistry of Aluminum*. CRC Lewis Publishers. Boca Raton, FL.
- Kooner, Z.S., P.M. Jardine, S. Feldman. 1995. Competitive surface complexation reactions of  $\text{SO}_4^{2-}$  and natural organic carbon on soil. *J. Environ. Qual.* 24:656-662.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.P. Gwo. 1995. Multi-region flow and transport in unsaturated soil. (In) S.G. Pandalai (ed.) *Trends in Hydrology*. Council of Scientific Research Integration. Trivandrum, India.
- Taylor, D.L. and P.M. Jardine. 1995. Analysis of Co(II)EDTA and Co(III)EDTA in pore water by ion chromatography. *J. Environ. Qual.* 24:789-792.
- Gwo, J.P., P.M. Jardine, G.T. Yeh, and G.V. Wilson. 1994. MURF user's guide: A finite element model of multiple-pore-region flow through variably saturated subsurface media. Oak Ridge National Laboratory, ORNL/GWPO-011.
- Gwo, J.P., P.M. Jardine, G.T. Yeh, and G.V. Wilson. 1995. MURT user's guide: A finite element model of multiple-pore-region transport through variably saturated subsurface media. Oak Ridge National Laboratory, ORNL/GWPO-015.

- Jardine, P.M. and D.L. Taylor. 1995. Kinetics and mechanisms of Co(II)EDTA oxidation by pyrolusite. *Geochimica et Cosmochimica Acta*. 59:4193-4203.
- Gwo, J.P., P.M. Jardine, G.V. Wilson, and G.T. Yeh. 1996. Using a multiregion model to study the effects of advective and diffusive mass transfer on local physical nonequilibrium and solute mobility in a structured soil. *Water Resour. Res.* 32:561-570.
- Brooks, S.C., D.L. Taylor, and P.M. Jardine. 1996. Reactive transport of EDTA-complexed cobalt in the presence of ferrihydrite. *Geochimica et Cosmochimica Acta*. 60:1899-1908.
- Reedy, O.C., P.M. Jardine, G.V. Wilson, and H.M. Selim. 1996. Quantifying diffusive mass transfer of non-reactive solutes in columns of fractured saprolite using flow interruption. *Soil Sci. Soc. Am. J.* 60:1376-1384.
- O' Brien, R., P.M. Jardine, J.P. Gwo, L.D. McKay, and A. Harton. 1998. Experimental and numerical evaluation of solute transport processes in fractured saprolites. *Water Resour. Res.* (in revision).
- Szecsody, J.M., J.M. Zachara, A. Chilakapati, P.M. Jardine, and A.S. Ferreny. 1998. Importance of flow and particle-scale heterogeneity on Co(II/III)EDTA reactive transport. *J Hydrol.* 209:112-136.
- Wilson, G.V., J.P. Gwo, P.M. Jardine, and R.J. Luxmoore. 1998. Hydraulic and physical nonequilibrium effects on multi-region flow and transport. p. 37-61 (In) H.M. Selim and L. Ma. *Physical Nonequilibrium in Soils: Modeling and Application*. Ann Arbor Press, Inc. Chelsea, Michigan.
- Jardine, P.M., R. O'Brien, Wilson, G.V., and J.P. Gwo. 1998. Experimental techniques for confirming and quantifying physical nonequilibrium processes in soils. p. 243-271. (In) H.M. Selim and L. Ma. *Physical Nonequilibrium in Soils: Modeling and Application*. Ann Arbor Press, Inc. Chelsea, Michigan.
- McCarthy, J.F., K.R. Czerwinski, W.E. Sanford, P.M. Jardine, and J.D. Marsh. 1998. Mobilization of transuranic radionuclides from disposal trenches by natural organic matter. *J. Contamin. Hydrol.* 30:49-77.
- Brooks, S.C., D.L. Taylor, and P.M. Jardine. 1998. Thermodynamics of bromide exchange on ferrihydrite: Implications for bromide transport. *Soil Sci. Soc. Am. J.* 62:1275-1279.
- Gwo, J.P., R. O'Brien, and P.M. Jardine. 1998. Mass transfer in structured porous media: embedding mesoscale structure and microscale hydrodynamics in a two-region model. *J Hydrol.* 208:204-222.
- Gwo, J.P., G.V. Wilson, P.M. Jardine, and E.F. D'Azevedo. 1999. Modeling subsurface contaminant reactions and transport at the watershed scale. *Proceedings of the 1997 Chapman/Outreach Conference Assessment of Non-Point Source Pollution in the Vadose Zone*. Geophysical Monograph 108. p. 31-43.
- Fendorf, S.E., P.M. Jardine, D.L. Taylor, and S.C. Brooks. 1999. Auto-inhibition of oxide mineral oxidative capacity toward Co(II)EDTA: Time-resolved studies using XANES spectroscopy. (In)

Sparks, D.L. and T. Grundel (eds.) Kinetics and mechanisms of sorption processes at the mineral-water interface. ACS Symposium Series 715. pp. 358-371.

Fendorf, S.E., P.M. Jardine, R.R. Patterson, D.L. Taylor, and S.C. Brooks. 1999. Pyrolusite surface transformations measured in real-time during the reactive transport of Co(II)EDTA. *Geochim. Cosmochim. Acta.* 63:3049-3057.

Brooks, S.C., S.L. Carroll, and P.M. Jardine. 1999. Sustained bacterial reduction of Co(III)EDTA<sup>-</sup> in the presence of competing geochemical oxidation during dynamic flow. *Environ. Sci. Technol.* 33:3002-3011.

Jardine, P.M., S.E. Fendorf, M.A. Mayes, I.L. Larsen, S.C. Brooks, and W.B. Bailey. 1999. Fate and transport of hexavalent chromium in undisturbed heterogeneous soil. *Environ. Sci. Technol.* 33:2939-2944.

Jardine, P.M., W.E. Sanford, J.P. Gwo, O.C. Reedy, D.S. Hicks, R.J. Riggs, and W.B. Bailey. 1999. Quantifying diffusive mass transfer in fractured shale bedrock. *Water Resour. Res.* 35:2015-2030.

Barnett, M.O., P.M. Jardine, S.C. Brooks, and H.M. Selim. 2000. Adsorption and transport of U(VI) in subsurface media. *Soil Sci. Soc. Am. J.* 64:908-917.

Jardine, P.M., S.C. Brooks, G.V. Wilson, and W.E. Sanford. 2000. Basic research strategies for resolving remediation needs in contaminated fractured media. (In) *Dynamics of Fluids in Fractured Rocks* (ed) B. Faybishenko. Geophysical Monograph 122, p. 389-400.

Jardine, P.M., G.V. Wilson, R.J. Luxmoore, and J.P. Gwo. 2001. Conceptual Model of Vadose-Zone Transport in Fractured Weathered Shales. (In) *Conceptual Models of Flow and Transport in the Fractured Vadose Zone*. U.S. National Committee for Rock Mechanics. National Research Council. National Academy Press, Washington D.C. p. 87-114.

Mayes, M.A., P.M. Jardine, I.L. Larsen, S.C. Brooks, and S.E. Fendorf. 2000. Multispecies contaminant transport in undisturbed columns of weathered, fractured saprolite. *J. Contam. Hydrol.* 45:243-265.

Ainsworth, C.C., F.J. Brockman, and P.M. Jardine. 2000. Vadose Zone State-of-the-Knowledge: Biogeochemistry. (In) *Vadose Zone: Science and Technological Solutions* (ed.) B.B. Looney and R.W. Falta. Battelle Press, Columbus, OH, volume II, p. 829-947.

- Jardine, P.M., R.J. Luxmoore, J.P. Gwo, and G.V. Wilson. 2000. Characterization and monitoring of unsaturated flow and transport processes in structured soils. (In) *Vadose Zone: Science and Technological Solutions* (ed.) B.B. Looney and R.W. Falta. Battelle Press, Columbus, OH, volume I, p. 475-492.
- Saiers, J.E., H. Guha, P.M. Jardine, and S.C. Brooks. 2000. Development and evaluation of a mathematical model for the transport and oxidation-reduction of CoEDTA. *Water Resour. Res.* 36:3151-3165.
- Clapp, C.E. M.H.B. Hayes, N. Senesi, P.R. Bloom, and P.M. Jardine. 2001 *Humic Substances and Chemical Contaminants*. Proceedings of a workshop/symposium cosponsored by the IHSS, SSSA, and ASA. Anaheim, CA, October 26-27, 1997.
- Guha, H. J.E. Saiers, S.C. Brooks, P.M. Jardine, and K. Jayachandran. 2001. Chromium transport, oxidation, and adsorption in manganese-coated sand. *J. Contamin. Hydrol.* 49:311-334.
- Gwo, J.P., E.F. D'Azevedo, H. Frenzel, M. A. Mayes, G.T. Yeh, P.M. Jardine, K.M. Salvage, and F.M. Hoffman. 2001. HBGC123D: A high performance computer model of coupled hydrological and biogeochemical processes. *Computers and Geosciences.* 27:1231-1242.
- Bostick, B.C., M.O. Barnett, P.M. Jardine, S.C. Brooks, S.E. Fendorf. 2002. Uranyl surface species formed on subsurface media from DOE facilities. *Soil Sci. Soc. Am. J.* 66:99-108.
- Jardine, P.M., T.L. Mehlhorn, I.L. Larsen, W.B. Bailey, S.C. Brooks, Y. Roh, and J.P. Gwo. 2002. Influence of hydrological and geochemical processes on the transport of chelated-metals and chromate in fractured shale bedrock. *J. Contamin. Hydrol.* 55:137-159.
- Barnett, M.O., P.M. Jardine, and S.C. Brooks. 2002. U(VI) adsorption to heterogeneous subsurface media: Application of a surface complexation model. *Environ. Sci. Technol.* 36:937-942.
- Jardine, P.M. 2002. Radionuclides. (In) *Encyclopedia of Soil Science*. R. Lal (ed.) Marcel Dekker, Inc. pp 1092-1097.
- Lenczewski, M., P.M. Jardine, L. McKay, and A. Layton. 2003. Natural attenuation of trichloroethylene (TCE) in fractured shale bedrock. *J. Contamin. Hydrol.* 64(3-4):151-168.
- Yang, J.K., M.O. Barnett, P.M. Jardine, and S.C. Brooks. 2003. Factors controlling the bioaccessibility of arsenic(V) and lead(II) in soil. *Soil and Sediment Contamination.* 12(2):165-179.
- Mayes, M.A., P.M. Jardine, T.L. Mehlhorn, B.N. Bjornstad, J.L. Ladd, and J.M. Zachara. 2003. Hydrologic processes controlling the transport of contaminants in humid region structured soils and semi-arid laminated sediments. *J. Hydrol.* 275:141-161.
- Stewart, M.A., P.M. Jardine, M.O. Barnett, T.L. Mehlhorn, K. Hyder, and L. McKay. 2003. Influence of soil geochemical and physical properties on the sorption and bioaccessability of Cr(III). *J. Environ. Qual.* 32:129-137.

- Stewart, M.A., P.M. Jardine, C.C. Brandt, M.O. Barnett, S.E. Fendorf, L.D. McKay, T.L. Mehlhorn, and K. Paul. 2003. Effects of contaminant concentration, aging, and soil properties on the bioaccessibility of Cr(III) and Cr(VI) in contaminated soils. *Soil and Sediment Contamination* 12:1-21.
- Yang, J.-K., M.O. Barnett, P.M. Jardine, N.T. Basta, and S.W. Casteel. 2002. Adsorption, sequestration, and bioaccessibility of As(V) in soils. *Environ. Sci. Technol.* 36:4562-4569.
- Gu, B., S.C. Brooks, and P.M. Jardine. 2003. Geochemical reactions and dynamics during titration of a contaminated groundwater with high uranium, aluminum, and calcium. *Geochim. Cosmochim. Acta.* 67:2749-2761.
- Jardine, P.M., T.L. Mehlhorn, Y. Roh, and W.E. Sanford. 2003. Hydrological and geochemical processes controlling the fate and transport of contaminants in fractured bedrock. (In) W.L. Kingery and H.M. Selim (eds.) *Geochemical and Hydrological Reactivity of Heavy Metals in Soils*. pp. 1-24. CRC Lewis Publishers. Boca Raton, FL.
- Jardine, P.M., G.V. Wilson, and M.A. Mayes. 2003. Case studies of vadose zone flow and transport in structured soils from high recharge regimes. *Vadose Zone Journal* (in revision).
- Jardine, P.M. 2004. Kinetic Models (In) *Encyclopedia of Soils in the Environment*. D. Hillel (ed.) Academic Press, London, UK p. 307-315.
- Fienen, M.N. P.K. Kitanidis, D.B. Watson, and P.M. Jardine. 2004. An application of Inverse Methods to Vertical Deconvolution of Hydraulic Conductivity in a Heterogeneous Aquifer at Oak Ridge National Laboratory. *Mathematical Geology.* 36(1)101-126.
- Zhang, C.L., S.C. Brooks, P.M. Jardine, and H. Vali. 2003. Factors affecting microbial uranium reduction implications for bioremediation. *Proceedings of the National Conference on Environmental Science and Technology*. September 8-10, 2002 A Greensboro, North Carolina.
- Pace, M.N., M.A. Mayes, P.M. Jardine, T.L. Mehlhorn, and J.M. Zachara. 2003. Quantifying the effects of small-scale heterogeneities on flow and transport in undisturbed cores from the Hanford Formation. *Vadose Zone Journal.* 2:664-676.
- Yeh, G.T., Y. Li, P.M. Jardine, W.D. Burgos, Y. Fang, M.-H. Li, W.D. Siegel. 2004. HYDROGEOCHEM 4.0: A coupled model of fluid flow, thermal transport, and HYDROGEOCHEMical transport through saturated-unsaturated media: version 4.0. ORNL/TM-2004/103.
- Yeh, G.T., J. Sun, P.M. Jardine, W.D. Burgos, Y. Fang, M.-H. Li, W.D. Siegel. 2004. HYDROGEOCHEM 5.0: A three-dimensional model of coupled fluid flow, thermal transport, and HYDROGEOCHEMical transport through variably saturated conditions: version 5.0. ORNL/TM-2004/107.

W.M. Post, R.C. Izaurrealde, J.D. Jastrow, B.A. McCarl, J.E. Amonette, V.L. Bailey, H. Bolton Jr., L.E. Drinkwater, C.T. Garten Jr., P.M. Jardine, G. Marland, R.M. Miller, N.J. Rosenberg, R. Sands, J.L. Smith, R. Lal, R. Matamala, P. Puget, T.O. West, J. Zhou. 2004. Carbon Sequestration Enhancement in U.S. Soils. *Bioscience*. 54:895-908.

Gu, B., Y.-K. Ku, and P.M. Jardine. 2004. Sorption and binary exchange of nitrate, sulfate, and uranium on an anion-exchange resin. *Environ. Sci. Technol.* 38:3184-3188.

Heuscher, S.A., C. C. Brandt, and P. M. Jardine. 2005. Bulk Density Estimation for the USDA-NRCS National Soil Survey Characterization Data. *Soil Sci. Soc. Am. J.* 69:51-56.

J.-P. Gwo, P.M. Jardine, W. Sanford, 2005. Effect of advective mass transfer on field scale fluid and solute movement: Field and modeling studies at a waste disposal site in fractured rock at Oak Ridge National Laboratory, Tennessee, USA. *Hydrogeology Journal*, Vol. 13, No. 4, August 2005, p565-583.

Watson, D.B. W.E. Doll, T.J. Gamey, J.R. Sheehan, and P.M. Jardine. 2005. Plume and lithologic profiling with surface resistivity and seismic tomography. *Ground Water* 43 (2): 169-177.

Mayes, M.A., Yin, X.L., Pace, M.N., and Jardine, P.M. 2005. Rates and mechanisms of Co(II)EDTA<sup>2-</sup> interactions with sediments from the Hanford site. In: *ACS Symposium Series 910: Biogeochemistry of Chelating Agents*, Nowack, B. and Van Briesen, J., Eds., pp. 278-296.

Mayes, M.A., Mehlhorn, T.L., and Jardine, P.M. 2005. Coupled hydrological and geochemical processes influencing the transport of chelated metals in the ORNL vadose zone and groundwater. In: *ACS Symposium Series 910: Biogeochemistry of Chelating Agents*, Nowack, B. and Van Briesen, J., Eds., pp. 297-315.

Mayes, M.A., Pace, M. N., Jardine, P.M., Fendorf, S.E., Farrow, N.D., Yin, X.L, and Zachara, J.M. 2005. Coupled hydrological and geochemical processes governing the fate and transport of Sr and U in the Hanford vadose zone. In: *ACS Symposium Series 904: Subsurface Contamination Remediation Accomplishments of the Environmental Management Science Program*, Zachry, T., and Berkey, E., Eds., pp. 229-250.

Gwo, J.P., P.M. Jardine, W.E. Sanford. 2005. Modeling field-scale multiple tracer injection at a low-level disposal site in fractured rocks: Effect of multiscale heterogeneity and source term uncertainty on conceptual understanding of mass transfer processes. *J. Contamin. Hydrol.* 77 (1-2): 91-118.

Luo, J., O.A. Cirpka, W. Wu, M.N. Fienen, T.L. Mehlhorn, P.M. Jardine, D.B. Watson, C.S. Criddle, and P.K. Kitanidis. 2005. Mass-transfer limitation for nitrate removal in a uranium-contaminated aquifer at Oak Ridge, TN. *Environ. Sci. Technol.* 39:8453-8459.

Luo, J.; W. Wu; M. N. Fienen; P. M. Jardine; T. L. Mehlhorn; D. B. Watson; O. A. Cripka; C. S. Criddle; P. K. Kitanidis. 2005 A nested-cell approach for in situ remediation. *Ground Water*. (in press).

Fields, M.W., T. Yan, S.K. Rhee, S.L. Carroll, P.M. Jardine, D.B. Watson, C.S. Criddle, and J. Zhou. 2005. Impacts on microbial communities and cultivable isolates from groundwater contaminated with high levels of nitric acid-bearing uranium waste. *FEMS Microbiol. Ecol.* 53 (3): 417-428.

- Wu, W.M., Gu, B., Fields, M.W., Gentile, M., Ku, Y., Yan, H., Tiquias, S., Yan, T., Nyman, J., Zhou, J., Jardine, P.M., and Criddle, C.S. 2005. Uranium (VI) reduction and sorption by denitrifying biomass. *Bioremediation Journal* (in press).
- O'Dell, J.D., P.M. Jardine, and G.V. Wilson. 2005. Subsurface transport of sediment and colloids from a field soil during storm events. *J. Contamin. Hydrol.* (in preparation).
- Jardine, P.M., T.L. Mehlhorn, S.C. Brooks, and S.E. Fendorf. 2005. Geochemical processes governing the fate and transport of Cr(III) and Cr(VI) in soils and sediments. *Soil Sci. Soc. Am. J.* (in preparation).
- Du Bosq, T.W., R.E. Peale, A. Weeks, P.M. Jardine, M. Stewart, J. Grantham, D. Dillery, and G. Boreman. 2005. Terahertz and millimeter wave transmission of soils. *Proceedings of the Photonics West 2005 Conference*. San Jose, CA, Jan 24-29.
- Gwo, J.P and P.M. Jardine. 2005. CdEDTA<sup>2-</sup> adsorption to weathered shale-limestone saprolite: Modeling the adsorption mechanism and effect of Al-oxide co-dissolution on Fe-oxide dissolution dynamics. *Soil Sci.* 170 (5): 325-339.
- Gao, W., Y. Liu, C.S. Giometti, L. Wu, X. Liu, T. Yan, S. Tollaksen, T. Khare, D. Stanek, T.L. Mehlhorn, P.M. Jardine, D. Xu, M.W. Fields, Y. Xu, and J. Zhou. 2005. A prohibitin-like protein of *Shewanella oneidensis* MR-1 is involved in iron homeostasis and oxidative damage protection. *J. Biological Chem.* (in press).
- Gu, B., W. Wu, M.W. Fields, M.V. Ginder, H. Yan, S. Fendorf, C.S. Criddle, and P.M. Jardine. 2005. Bioreduction of uranium in a contaminated soil column. *Environ. Sci. Technol.* 39 (13): 4841-4847.
- Gwo, J.P., M.A. Mayes, and P.M. Jardine. 2005. Scalability of a matrix diffusion and advective transfer conceptual model from laboratory to field. *Ground Water*. (submitted).
- Ginder-Vogel, M.A., T. Borch, M. Mayes, P.M. Jardine, and S.E. Fendorf. 2005. Chromate reduction and retention processes within Hanford Sediments. *Environ. Sci. Technol.* 39:7833-7839.
- Yang, J.K., M.O. Barnett, J. Zhuang, S.E. Fendorf, and P.M. Jardine. 2005. Adsorption, oxidation, and bioaccessibility of As(III) in soils. *Environ. Sci. Technol.* 39:7102-7110.
- Jardine, P.M., M.A. Mayes, J. R. Tarver, P. J. Hanson, P.J. Mulholland, G.V. Wilson, and J.F. McCarthy. 2005. Exploring Vadose Zone Flow and Transport of Dissolved Organic Carbon at Multiple Scales in Humid Regimes. *Vadose Zone Journal* (in press).
- Phillips, D.H., D.B. Watson, Y. Roh, and P.M. Jardine. 2005. Impacts of stratigraphy, subsurface hydrology and groundwater geochemistry on uranium distribution in weathered fractured shale. *Soil Sci. Soc. Am. J.* (submitted).
- Fields, M.W., T. Yan, S.K. Rhee, S.L. Carroll, P.M. Jardine, D.B. Watson, C.S. Criddle, and J. Zhou. 2005. Changes in bacterial community structure correlate with initial operating conditions of a field-scale denitrifying fluidized bed reactor. *Applied Microbiology and Biotechnology*. (in

press).

Wu., W.M., J. Carley, M. Fienen, T. Mehlhorn, H. Yan, S. Carroll, K. Lowe, J. Nyman, J. Luo, M. Gentile, R. Rajan, D. Wagner, R. Hickey, D. Watson, O. Cirpka, P. Kitanidis, P.M. Jardine, and C.S. Criddle. 2005. Field-scale bioremediation of uranium in a highly contaminated aquifer I: conditioning of a treatment zone. *Environ. Sci. Technol.* (submitted).

Wu., W.M., J. Carley, S. Carroll, O. Cirpka, M.W. Fields, M. Fienen, M.E. Gentile, T. Gentry, M.A. Ginder-Vogel, R.F. Hickey, J. Luo, T.L. Mehlhorn, J. Nyman, H. Yan, D.B. Watson, J. Zhou, S.E. Fendorf, P. Kitanidis, P.M. Jardine, and C.S. Criddle. 2005. Field-scale bioremediation of uranium in a highly contaminated aquifer II: geochemical control of U(VI) bioavailability and evidence of U(VI) reduction. *Environ. Sci. Technol.* (submitted).

Hwang, C. W. Wu, T. Gentry, J. Carley, S. Carroll, C. Schadt, D.B. Watson, P.M. Jardine, J. Zhou, R. Hickey, C. Criddle, and M.W. Fields. 2005. Changes in microbial community structure correlate with stressed operating conditions during start-up of a field-scale denitrifying fluidized bed reactor. *Applied Microbiology and Biotechnology* (submitted).

Luo, J., O.A. Cirpka, F.A. Weber, W. Wu, J.L. Nyman, P.M. Jardine, C.S. Criddle, and P.K. Kitanidis. 2005. Modeling in-situ uranium(VI) bioreduction in the presence of nitrate and sulfate.

Luo, J. O.A. Cirpka, M.N. Fienen, W. Wu, T.L. Mehlhorn, J. Carley, P.M. Jardine, C.S. Criddle, and P.K. Kitanidis. 2005. A parametric transfer function concept for analyzing reactive transport in nonuniform flow (in press).

Zhang, F. G.T. Yeh, J.C. Parker, S.C. Brooks, M.N. Pace, and P.M. Jardine. 2005. Three-dimensional reactive chemical transport modeling in groundwater of watershed systems. *Water Resour. Res.* (submitted).

Fields, M.W., C.E. Bagwell, S.L. Carroll, T. Yan, X. Liu, D.B. Watson, P.M. Jardine, C.S. Criddle, T.C. Hazen, and J. Zhou. 2005. Gene sequences as indicators of bacterial community responses to mixed-waste contamination. *Environ. Sci. Technol.* (submitted).

Pace, M.N., Mayes, M.A., Jardine, P.M., Yin, X., Liu, Q., Mehlhorn, T.L. The influence of coupled hydrological and geochemical processes on SrEDTA<sup>-2</sup> and Sr<sup>+2</sup> transport in Hanford sediments. *J. Contamin. Hydrol.* (submitted).

Pace, M.N., Mayes, M.A., Jardine, P.M., Yin, X., Mehlhorn, T.L. Uranium(VI) Transport in Sediments from the Hanford Vadose Zone. *Environ. Sci. Technol.* (in prep.)

Pace, M.N., Mayes, M.A., Jardine, P.M., Mehlhorn, T.L., Zhang, F., Parker, J. The development of a surface complexation model for uranium transport in an undisturbed core from the NABIR Site, Oak Ridge, TN. *J. Contaminant Hydrology.* (in prep.)

Mayes, M.N., R.N. Dansby-Sparks, X.L. Yin, M.N. Pace, P.M. Jardine, L.D. McKay, and T.L. Mehlhorn. 2005. Variability and Anisotropy of Hydraulic Properties of Intact Hanford and Ringold Sediments. For submission to *Vadose Zone Journal*.

Mayes M.A., M.N. Pace, R.N. Dansby-Sparks, X.L. Yin, P.M. Jardine, L.D. McKay, T.L. Mehlhorn, and S.E. Fendorf. 2005. Fate and Transport of Uranium(VI) in Siliciclastic and Carbonate Subsurface Sediments from the Hanford Region. For submission to Environmental Science and Technology.

Mayes, M.A., X.L. Yin, M.N. Pace, P.M. Jardine, L.D. McKay, and T.L. Mehlhorn. 2005. Coupled Hydrology and Geochemistry of Uranium(VI) and CoEDTA in Unsaturated Intact Cores of the Ringold Formation. For submission to Soil Science Society of America Journal.

Chen, J., J. Peterson, M. Fienen, P.M. Jardine, D. Watson, and S. Hubbard. 2005. Development of a joint hydrogeochemical inversion approach and application to a contaminated fractured aquifer. Water Resour. Res. (submitted).

#### **WEB-BASED MANUSCRIPTS**

Jardine, P.M., D.B. Watson, D.A. Blake, L.P. Beard, S.C. Brooks, J.M. Carley, C.S. Criddle, W.E. Doll, M.W. Fields, S.E. Fendorf, G.G. Geesey, M. Ginder-Vogel, S.S. Hubbard, J.D. Istok, S. Kelly, K.M. Kemner, A.D. Peacock, B.P. Spalding, D.C. White, A. Wolf, W. Wu, J. Zhou. 2005. Techniques for Assessing the Performance of In Situ Bioreduction and Immobilization of Metals and Radionuclides in Contaminated Subsurface Environments. (<http://www.cistems.fsu.edu/agenda1.htm>)

#### **PRESENTATIONS and ABSRACTS:**

Jardine, P.M., and D.L. Sparks. 1981. Thermodynamics of potassium exchange using a kinetic approach. IN Agronomy Abstracts, American Society of Agronomy, Madison Wisconsin.

Jardine, P.M. and D.L. Sparks. 1982. Kinetics and thermodynamics of K-Ca exchange in soils. 56th Colloid and Surface Science Symposium. Blacksburg, VA. (Invited).

Jardine, P.M. and D.L. Sparks. 1982. Potassium-calcium exchange in a multireactive soil system I. Kinetics p. 175. IN Agronomy Abstracts, American Society of Agronomy, Madison Wisconsin.

Jardine, P.M. and D.L. Sparks. 1982. Potassium-calcium exchange in multireactive soil system II. Thermodynamics p. 180. IN Agronomy Abstracts, American Society of Agronomy, Madison Wisconsin.

Jardine, P.M., L.W. Zelazny, and J.C. Parker. 1984. Mechanisms of Al adsorption of clay minerals and peat. p. 181. IN Agronomy Abstracts, American Society of Agronomy, Madison Wisconsin.

Jardine, P.M., J.C. Parker, and L.W. Zelazny. 1984. Kinetics and mechanisms of Al transport on kaolinite using a two-site nonequilibrium transport model. p. 168. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

Jardine, P.M., and J.C. Parker. 1985. Effects of multisite ion selectivity and adsorption kinetics on K-Ca transport in soils. IN EOS. American Geophysical Union National Meeting, Baltimore, MD.

Jardine, P.M., and L.W. Zelazny. 1985. Mononuclear and polynuclear aluminum speciation through differential kinetic reactions with ferron. p. 149. IN Agronomy Abstracts, American Society of Agronomy, Madison, WI.

Jardine, P.M., and L.W. Zelazny. 1986. Influence of inorganic and organic anions on the speciation of mononuclear and polynuclear aluminum by ferron. p. 169. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

Wilson, G.V., R.J. Luxmoore, P.M. Jardine, and J.R. Jones. 1987. Scaling of hydrologic properties for simulation of watershed drainage. p. 164. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

Jardine, P.M., G.V. Wilson, R.J. Luxmoore. 1987. Modeling the transport of inorganic ions through undisturbed soil columns from two contrasting watersheds. p. 159. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

Jardine, P.M. 1987. Mononuclear and polynuclear aluminum speciation through differential kinetic reactions with ferron. American Chemical Society, New Orleans, LA.

Jardine, P.M., N.L. Weber, and J.F. McCarthy. 1988. Chemical and hydrologic factors controlling the transport of organic colloids. Subsurface transport program interactive seminar series. Manteo, NC.

Jardine, P.M., G.V. Wilson, R.J. Luxmoore, and J.R. Jones. 1988. Modeling solute transport through undisturbed soil columns and on a isolated pedon in the field. p. 47. International Conference and Workshop on the Validation of Flow and Transport Models for the Unsaturated Zone. New Mexico State University, Las Cruces, New Mexico.

Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.R. Jones. 1988. Scaling of hydrologic properties for simulation of watershed drainage. p. 109. International Conference and Workshop on the Validation of Flow and Transport Models for the Unsaturated Zone. New Mexico State University, Las Cruces, New Mexico.

Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.R. Jones. 1988. Hydrology of a forested watershed during storm events. p. 192. IN Agronomy Abstracts, American Society of agronomy, Madison, Wisconsin.

Jardine, P.M., G.V. Wilson, R.J. Luxmoore. 1988. Saturated and unsaturated solute transport through an isolated pedon. p. 185. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin. (Invited).

Luxmoore, R.J., P.M. Jardine, G.V. Wilson, J.R. Jones, and L.W. Zelazny. 1988. Rainfed channeling flows through forested hillslopes. p. 186. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

- Jardine, P.M., N.L. Weber, and J.F. McCarthy. 1988. Mechanisms of dissolved organic carbon adsorption on soil. p. 207. IN Agronomy Abstracts, American Society of agronomy, Madison, Wisconsin.
- Wilson, G.V., P.M. Jardine, R.J. Luxmoore, P.J. Mulholland, and L.W. Zelazny. 1989. Subsurface transport of inorganic solutes from an upper hillslope during storm events. EOS, Trans. Am. Geophys. Union.
- Jardine, P.M., G.V. Wilson, J.F. McCarthy, R.J. Luxmoore, and D.L. Taylor. 1989. Subsurface transport of dissolved organic carbon through a forested hillslope during storm events. EOS, Trans. Am. Geophys. Union. (Invited).
- Mulholland, P.J., G.V. Wilson, and P.M. Jardine. 1989. Upland versus lowland control of hydrogeochemical response of a forested watershed in a Karst, unglaciated terrain. EOS, Trans. Am. Geophys. Union.
- Luxmoore, R.J., G.V. Wilson, P.M. Luxmoore, and R.H. Gardner. 1989. Use of percolation theory and latin hypercube sampling in field-scale solute transport investigations. Abstracts for International Workshop on "Field-scale Water and Solute Flux in Soils", September 25-29, 1989, Monte Verita, Switzerland. Swiss Federal Institute of Technology (ETH), Zurich, Switzerland
- Jardine, P.M. 1989. Modeling the kinetics of inorganic reactions in soil. p. 201. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin. (Invited).
- Jardine, P.M., G.V. Wilson, J.F. McCarthy, R.J. Luxmoore, D.L. Taylor, and L.W. Zelazny. 1990. Hydrogeochemical processes controlling the transport of dissolved organic carbon through a forest hillslope. p. 503 EOS, American Geophysical Union. (Invited).
- Dunnivant, F.M. P.M. Jardine, D.L. Taylor, and J.F. McCarthy. 1990. Transport of dissolved organic matter and polychlorinated biphenyls in soil columns. American Chemical Society.
- McCarthy, J.F., L. Liang, P.M. Jardine, and T.M. Williams. 1990. Field manipulations of organic and inorganic colloids in a sandy aquifer. Subsurface transport program interactive seminar series. Manteo, NC.
- Saiers, J.E., J.F. McCarthy, P.M. Jardine, L.Liang, and G.M. Hornberger. 1990. Transport of amorphous TiO<sub>2</sub> through homogeneous and structurally heterogeneous porous media. Subsurface transport program interactive seminar series. Manteo, NC.
- Jardine, P.M., F.M. Dunnivant, and J.F. McCarthy. 1990. Modeling the transport of dissolved organic carbon in laboratory soil columns. p. 213. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- O'Dell, J.D., G.V. Wilson, P.M. Jardine, and D.E. Todd. 1990. Field-scale subsurface transport of solutes from a forested hillslope. p. 216. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

- Jardine, P.M., G.V. Wilson, J.F. McCarthy, R.J. Luxmoore, D.L. Taylor, and L.W. Zelazny. 1990. Hydrogeochemical processes controlling the transport of dissolved organic carbon through a forested hillslope. p. 231. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin. (Invited).
- Zelazny, L.W., P.M. Jardine, G.V. Wilson, D.A. Lietzke, and R.J. Luxmoore. 1990. Aluminum solubility and mineral weathering in a forested watershed during rainstorm events. p. 354. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Jardine, P.M. and G.K. Jacobs. 1990. Unsaturated transport of inorganic cations in undisturbed soil columns. Radionuclide Adsorption Workshop. LANL, Los Alamos, NM. Sept 11-12. (Invited).
- Gwo, J.P., G.T. Yeh, P.M. Jardine, and G.V. Wilson. 1991. A multi-region approach to modeling subsurface transport. EOS, Trans. Am. Geophys. Union.
- Gwo, J.P., G.T. Yeh, G.V. Wilson, and P.M. Jardine. 1991. Modeling subsurface flow with a multi-region approach. EOS, Trans. Am. Geophys. Union.
- Jardine, P.M., G.V. Wilson, G.T. Yeh, R.J. Luxmoore, J.D. O'Dell, and J.P. Gwo. 1991. Experimental and theoretical aspects of subsurface contaminant transport at multiple scales. Emerging Technologies for Hazardous Waste Management. American Chemical Society. Oct. 1-3, 1991.
- G.V. Wilson, P.M. Jardine, G.T. Yeh, J.D. O'Dell, and J.P. Gwo. 1991. Multi-region flow and transport under field-scale conditions: conceptualization and experimentation. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- J.D. O'Dell, P.M. Jardine, and G.V. Wilson. 1991. Inorganic colloid mediated solute transport in a field soil during storm events. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Jardine, P.M., G.V. Wilson, T.M. Williams, and J.F. McCarthy. 1991. Chemical and physical processes that control the mobility of natural organic material in aquifer sediments. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Jardine, P.M., G.K. Jacobs, and Z.S. Kooner. 1991. Transport of contaminants and co-contaminants in unsaturated undisturbed soil columns. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Gwo, J.P., G.T. Yeh, G.V. Wilson, and P.M. Jardine. 1991. Modeling a soil column infiltration problem using a multi-region subsurface flow and transport approach. EOS, Trans. Am. Geophys. Union. Dec. 1991.
- Gwo, J.P., G.T. Yeh, and P.M. Jardine. 1992. Multi-region modeling of soil column tracer injections. EOS, Trans. Am. Geophys. Union. Dec. 1992.
- Jardine, P.M., R.J. Luxmoore, G.V. Wilson, and J.D. O'Dell. 1992. Experimental aspects of subsurface contaminant transport at multiple scales. Geological Society of America, Cincinnati, OH, October 26-29, 1992. (Invited).

- Jardine, P.M., G.K. Jacobs, and D.L. Taylor. 1992. Unsaturated transport of co-contaminants in undisturbed heterogeneous porous media. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Jacobs, G.K., Z.S. Kooner, and P.M. Jardine. 1992. Adsorption of cobalt onto natural calcite and the effect of EDTA complexing. EOS, Trans. Am. Geophys. Union. 73:130.
- Kooner, Z.S., P.M. Jardine, L.W. Zelazny, and G.V. Wilson. 1992. Spatial heterogeneity of competitive cationic electrostatic interactions with soil. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Wilson, G.V., J.D. O'Dell, M. Collineau, and P.M. Jardine. 1992. Field-scale experiments on 3-dimensional multi-region transport of tracers at Melton Branch. (In) F. Quinones and K.L. Hoadley (ed.) Fifth Tennessee Water Resources Symposium. Nashville, TN. October 19-21, 1992.
- Palumbo, A.V., J.F. McCarthy, R.S. Burlage, P.M. Jardine, and G.V. Wilson. 1993. The application of molecular techniques to bacterial transport experiments: examples from vadose zone and aquifer studies. Second International Symposium on Microbiology of the Deep Subsurface. Bath, England. September, 1993.
- Palumbo, A.V., P.M. Jardine, R.S. Burlage, S. Scarborough, and G.V. Wilson. 1993. Transport of bacteria in an unsaturated pedon. 93rd Annual Meeting, American Society for Microbiology, Atlanta, GA. May 1993.
- Gwo, J.P., P.M. Jardine, G.T. Yeh, and G.V. Wilson. 1993. Modeling subsurface flow and transport in the Melton Branch Watershed using multiple pore region models. 4th Technology Information Exchange (TIE) Workshop, Knoxville, TN, May 11-13, 1993
- Kooner, Z.S. and P.M. Jardine. 1993. Competitive surface complexation reactions of  $\text{SO}_4^{2-}$  and natural organic carbon. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Jardine, P.M., and D.L. Taylor. 1993. On the kinetics of cobalt(II)EDTA<sup>2-</sup> oxidation by pyrolusite. IN Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.
- Gwo, J.P., P.M. Jardine, G.V. Wilson, and G.T. Yeh. 1994. Modeling small-scale physical non-equilibrium and large-scale preferential fluid and solute transport in a structured soil. X International Conference on Computation Methods in Water Resources, July 19-22, 1994, Heidelberg, Germany.
- O'Brien, R., and P.M. Jardine. 1994. Experimental characterization of mass transport processes in undisturbed macroporous media. American Geophysical Union. p. 146. May 23-27, 1994. Baltimore, MD.
- Homer, V.J., P.M. Jardine, and R.J. Luxmoore. 1994. Mapping soil pore heterogeneities for percolation fluid/solute transport models. American Geophysical Union. p. 147. May 23-27, 1994. Baltimore, MD.

Homer, V.J., P.M. Jardine, and R.J. Luxmoore. 1994. Scaling up in percolation modeling for fluid/solute transport. Chapman conf. on hydrogeologic processes. June 6-9, 1994.

Homer, V.J., J.F. McCarthy, P.M. Jardine, and Z.H. Chen. 1994. Scattering approaches to monitoring humic acid aggregation: Fractal dimensions, absolute scattering intensities. 7<sup>th</sup> International IHSS meeting. July, 1994.

Jardine, P.M., and D.L. Taylor. 1994. Reactive transport of cobalt-EDTA complexes in subsurface environments: Remedial challenges. Emerging Technologies for Hazardous Waste Management. American Chemical Society. Sept. 19-21, 1994.

Reedy, O.C., P.M. Jardine, and H.M. Selim. 1994. Flow interruption: A proposed remediation technique to enhance subsurface contaminant removal. Emerging Technologies for Hazardous Waste Management. American Chemical Society. Sept. 19-21, 1994.

Sanford, W.E., P.M. Jardine, and D.K. Solomon. 1994. Examining matrix diffusion in fractured shales with noble gases. American Geological Society. Nov. 1994.

Jardine, P.M., D.L. Taylor, and J.M. Szecsody. 1994. Influence of competitive, time-dependent geochemical reactions on the fate and transport of organo-metal complexes. In Agronomy Abstracts. American Society of Agronomy, Madison, WI. (Invited).

Reedy, O.C., P.M. Jardine, and H.M. Selim. 1994. Quantifying diffusive mass transfer of non-reactive solutes in undisturbed soil columns using flow interruption. In Agronomy Abstracts. American Society of Agronomy, Madison, WI.

O'Brien, R., and P.M. Jardine. 1994. Experimental characterization of mass transport processes in undisturbed macroporous media. In Agronomy Abstracts. American Society of Agronomy, Madison, WI.

Ma, L., P.M. Jardine, and H.M. Selim. 1994. Rate limited processes of solute transport in soils: physical nonequilibrium approaches. In Agronomy Abstracts. American Society of Agronomy, Madison, WI.

Jacobs, G.K., P.M. Jardine, R.J. Luxmoore, and V.J. Homer. 1994. Modeling mineral dissolution as a contributing factor to the chemical signature of "old" water in the unsaturated zone. American Geological Society. Nov. 1994.

Szecsody, J.M., J.M. Zachara, A.S. Ferreny, and P.M. Jardine. 1994. Simulating transport and geochemical reactions of Co(II)EDTA through chemically heterogeneous sediment. American Geophysical Union. December. 1994. (Invited).

Wilson, G.V., J.P. Gwo, P.M. Jardine, and G.T. Yeh. 1994. Field-scale mass transport and the effect of local-scale non-equilibrium. American Geophysical Union. December. 1994.

Reedy, O.C., P.M. Jardine, H.M. Selim. 1995. Quantifying diffusive mass transfer of non-reactive solutes in undisturbed soil columns using flow interruption. American Society of Agronomy, Soil Science Society of America, January 28- February 1, Baton Rouge, LA.

Brooks, S.C., P.M. Jardine, and D.L. Taylor. 1995. Reactive transport of Co-EDTA complexes in the

presence of ferrihydrite. American Geophysical Union. Baltimore, MD. Spring 1995.

Jardine, P.M., O.C. Reedy, R. O'Brien, W.E. Sanford, D.S. Hicks, and G.P. Gwo. 1995. Quantifying contaminant mass transfer processes at laboratory and field scales. V.M. Goldschmidt Conference, The Geochemical Society. May 24-26, Penn State University, University Park, PA. (Invited).

Jardine, P.M., O.C. Reedy, and R. O'Brien. 1995. Quantifying the diffusive mass transfer of contaminants in fractured weathered shales. Geologic Society of America. April 6-7, Knoxville, Tennessee.

Wilson, G.V., P.M. Jardine, and J.P. Gwo. 1995. Field-scale multi-region transport through a saprolitic vadose zone. Geologic Society of America. April 6-7, Knoxville, Tennessee.

Wasserman, D.M., and P.M. Jardine. 1995. Progress in recycling at Oak Ridge National Laboratory. The Department of Energy Pollution Prevention Conference XI, Knoxville, TN. May 16-18, 1995.

Gwo, J.P., P.M. Jardine, and G.V. Wilson. 1995. Local advective-diffusive mass transfer and preferential flow and matrix diffusion non-equilibria. American Society of Agronomy. Oct. 29 -Nov. 3. St. Louis MO.

Jardine, P.M., W.E. Sanford, O.C. Reedy, D.S. Hicks, and J.P. Gwo. 1995. Field-scale contaminant mass transfer processes in fractured shales. American Society of Agronomy. Oct. 29 - Nov. 3. St. Louis MO.

Brooks, S.C., P.M. Jardine, and D.L. Taylor. 1995. Ferric iron in ferrihydrite oxidizes Co(II)EDTA to Co(III)EDTA. American Society of Agronomy. Oct. 29 -Nov. 3. St. Louis MO.

Sanford, W.E., P.M. Jardine, O.C. Reedy, and D.S. Hicks. 1995. Investigating mass transfer in fractured shales with multiple tracers. Geological Society of America. Nov. 6 - 9. New Orleans, LA.

Reedy, O.C., P.M. Jardine, G.V. Wilson, and H.M. Selim. 1995. Quantifying diffusive mass transfer of non-reactive solutes in undisturbed soil columns using flow interruption. American Geophysical Union. Dec. 11 - 15. San Francisco, CA.

Jardine, P.M., W.E. Sanford, O.C. Reedy, and J.P. Gwo. 1995. Multicomponent tracer injection at a DOE waste disposal site with fractured porous media: I. Experimental Findings. American Geophysical Union. Dec. 11 - 15. San Francisco, CA. (Invited).

Gwo, J.P., Jardine, P.M., W.E. Sanford, and O.C. Reedy. 1995. Multicomponent tracer injection at a DOE waste disposal site with fractured porous media: II. Application of a multiregion flow and transport model. American Geophysical Union. Dec. 11 - 15. San Francisco, CA. (Invited).

Jardine, P.M., W.E. Sanford, O.C. Reedy, J.P. Gwo, and D.S. Hicks. 1996. Quantifying contaminant mass transfer processes in fractured shale bedrock. 41<sup>st</sup> annual Midwest Groundwater Conference. Sept 29 - Oct 1. Lexington, KY.

Jardine, P.M., G.V. Wilson, J.D. O'Dell, J.F. McCarthy, and R.J. Luxmoore. 1996. Storm Driven Transport of Organic and Inorganic Colloids in Unsaturated Field Soils. American Society of Agronomy. Nov. 3 - 8. Indianapolis, IN. (Invited).

Jardine, P.M. 1996. An overview of subsurface processes that govern the conceptual framework of reactive transport models. (In) Reactive Transport Models Workshop. Soil Sci. Soc. Am., Indianapolis, IN, Nov. 2-3. (Invited).

Sanford, W.E., P.M. Jardine, D.S. Hicks, B.W. Lu, and O.C. Reedy. 1996. Tritium and tracer dynamics in a radioactively contaminated, fractured shale--implications for diffusive mass-transfer. Geological Society of America. Denver, Co. October 28-31.

Jardine, P.M., S.C. Brooks, D.S. Hicks, B.W. Lu, W.E. Sanford, and O.C. Reedy. 1996. Tritium dynamics within secondary contaminant sources in fractured shale bedrock. American Nuclear Society. Nov. 10-15. Washington D.C.

Fendorf, S., P.M. Jardine, and S.C. Brooks. 1997. Sorption induced inhibition of redox reactions involving manganese oxides. American Chemical Society. San Francisco, CA. April 13-17. (Invited).

Gwo, J.P., P.M. Jardine, G.V. Wilson, and E. D'Azevedo. 1997. Modeling subsurface contaminant reactions and transport at the watershed scale. AGU/Chapman/SSSA outreach conference. Riverside, CA. Oct. 19-24. (Invited).

Czerwinski, K., J.F. McCarthy, W.E. Sanford, P.M. Jardine, and J.D. Marsh. 1997. Geochemical modeling of trivalent actinide ion and natural organic matter interactions. American Chemical Society. Las Vegas, NV. Sept.

Mayes, M.A., O.C. Reedy, I.L. Larsen, S.C. Brooks, and P.M. Jardine. 1997. Multispecies contaminant transport in undisturbed columns of weathered fractured shale. American Society of Agronomy. Anaheim, CA. Oct. 26-31.

Sanford, W.E., and P.M. Jardine. 1997. Examining diffusion with multiple tracers to aid remediation of contaminated sites. American Society of Agronomy. Anaheim, CA. Oct. 26-31. (Invited).

Gwo, J.P., R. O'Brien, and P.M. Jardine. 1997. Characterization of mesoscale mass transfer processes in an undisturbed soil column using a two-region model. American Geophysical Union. Fall 1997

Mehlhorn, T.L., P.M. Jardine, S.C. Brooks, S.E. Fendorf, and J.E. Saiers. 1997. Geochemical processes governing the fate and transport of Cr(III) and Cr(VI) in soils. American Society of Agronomy. Anaheim, CA. Oct. 26-31.

Brooks, S.C., and P.M. Jardine. 1997. Bacterial reduction of toxic metals during dynamic flow. American Society of Agronomy. Anaheim, CA. Oct. 26-31. (Invited).

Mayes, M.A., O.C. Reedy, I.L. Larsen, S.C. Brooks, and P.M. Jardine. 1997. Multispecies contaminant transport in undisturbed columns of weathered fractured shale. Geologic Society of America Oct.

- Jardine, P.M., G.V. Wilson, W.E. Sanford, and R.J. Luxmoore. 1998. Exploring subsurface transport mechanisms in fractured media at laboratory and field scales. Conference on "Mass transport in fractured aquifers and aquitards" Geological Institute, University of Copenhagen, Denmark, May 14-16, 1998. (Invited).
- Jardine, P.M., S.C. Brooks, T.L. Mehlhorn, I.L. Larsen, W.E. Sanford, and J.P. Gwo. 1998. Quantifying diffusive mass transfer processes in fractured shale bedrock using multiple tracers. Groundwater Tracing Conference, Eastern Kentucky University, Richmond, KY, June 5-6, 1998.
- Jardine, P.M., S.C. Brooks, W.E. Sanford, T.L. Mehlhorn, I.L. Larsen, and J.P. Gwo. 1998. Multiple tracer techniques for quantifying contaminant mass transfer processes in fractured shale bedrock. American Geophysical Union, May 26-29, 1998, Boston, MA. (Invited).
- Zhang, C., S. Brooks, S. Fendorf, and P. Jardine. 1998. Microbial uranium reduction and biomineralization: implication for immobilization of toxic metals and radionuclides. 17th annual meeting for International Mineralogical Association, Toronto, August.
- Jardine, P.M. 1998. Can basic research on contaminant transport be used to improve the design of remedial strategies? Proceedings of "School of Environmental Science and Technology". Buenos Aires, Argentina. August 24-28. (Invited).
- Jardine, P.M., T.L. Mehlhorn, I.L. Larsen, and S.C. Brooks. 1998. Influence of time-dependent physical and chemical processes on the migration of chelated radionuclides in fractured shale. American Society of Agronomy. Baltimore, MD October 18-22. (Invited).
- Sanford, W.E., B. Bailey, and P.M. Jardine. 1998. Combining field tracer experiments and modeling to understand matrix-fracture exchange in shale aquitards. Geologic Society of America., Toronto.
- Jardine, P.M., S.C. Brooks, T.L. Mehlhorn, I.L. Larsen, and W.B. Bailey. 1998. Influence of time-dependent physical and chemical processes on the migration of chelated radionuclides in fractured shale. American Geophysical Union, Dec. 6-10, 1998, San Francisco, CA. (Invited).
- Guha, H., J.E. Saiers, P.M. Jardine, and S.C. Brooks. 1998. Development and evaluation of a mathematical model for oxidation, sorption, and transport of Co(II)EDTA<sup>2-</sup>. American Geophysical Union, Dec. 6-10, 1998, San Francisco, CA.
- Jardine, P.M. 1999. Basic research strategies for resolving remediation needs in contaminated fractured subsurface media. Symposium on Dynamics of Fluids in Fractured Rocks: Concepts and Recent Advances. Lawrence Berkeley National Laboratory. February 6-10, 1999, Berkeley, CA. (Invited).
- Jardine, P.M. 1999. Conceptual Model of Vadose-Zone Transport in Fractured Weathered Shales. Workshop on AConceptual Models of Flow and Transport in the Fractured Vadose Zone@. National Research Council. March 18-19, 1999, Irvine, CA. (Invited).
- Jardine, P.M., S.C. Brooks, M.A. Mayes, and T.L. Mehlhorn. 1999. Field-scale processes that govern the conceptual framework of hydrobiogeochemical models. Fifth SIAM conference on Mathematical and Computational Issues in the Geosciences. March 24-27, 1999, San Antonio, TX.

Haun, D.B., P.M. Jardine, S.R. Pickrell, L.D. McKay, and S.C. Brooks. 1999. Field-scale intrinsic bioremediation of trichloroethylene in fractured shale. American Society of Agronomy. Salt Lake City, UT, Oct. 31-Nov. 4, 1999.

Frenzel, H., M.A. Mayes, J.P. Gwo, P.M. Jardine, and G.T. Yeh. 1999. Application of a hydrobiogeochemistry computer model to fate and transport of co-contaminants in fractured saprolite. American Geophysical Union, Dec. 13-17, 1999, San Francisco, CA.

Jardine, P.M. 1999. Fate and Transport of Radionuclides Beneath the Hanford Tank-Farms: Unraveling Coupled Geochemical and Hydrological Processes in the Vadose Zone. Workshop on Hanford Tank Farm Needs, Environmental Management Science Program, Pacific Northwest National Laboratory. October, 1999, Richland, WA.

Jardine, P.M., S.C. Brooks, S.E. Fendorf, and J.E. Saiers. 2000. Containment of toxic metals and radionuclides in porous and fractured media: Optimizing biogeochemical reduction versus geochemical oxidation. Environmental Management Science Program National Meeting, April 24-27, 2000, Atlanta, GA.

Jardine, P.M., S.C. Brooks, S.E. Fendorf, C.C. Ainsworth, and B.N. Bjornstad. 2000. Fate and Transport of Radionuclides Beneath the Hanford Tank-Farms: Unraveling Coupled Geochemical and Hydrological Processes in the Vadose Zone. Environmental Management Science Program National Meeting, April 24-27, 2000, Atlanta, GA.

Jardine, P.M. Reactive chemical transport in intact media. Workshop on Subsurface processes at the mesoscale to evaluate research direction and facility needs in support of the DOE Environmental Management Program. Idaho National Engineering and Environmental Laboratory. May 8-9, 2000, Salt Lake City, UT. (Invited).

Brooks, S.C., and P.M. Jardine. 2000. The role of iron in the reactive transport of chelated metals: Observations from laboratory and field manipulations. Theis Conference 2000. Chattanooga, TN.

Jardine, P.M. 2000. Exploring subsurface transport processes at multiple scales. Kirkham Conference of the Soil Science Society of America Characterization of Properties and Processes in Soils Across Different Scales Iowa State University, Nov. 2-3, 2000. (Invited).

Jardine, P.M. 2000. Hydrologic and Geochemical Processes Controlling the Transport and Sequestration of Natural Organic Matter in Soil. Soil Science Society of America. Nov. 5-9, 2000, Minneapolis, Minnesota. (Invited).

Bostick, B.C., S.E. Fendorf, M.O. Barnett, P.M. Jardine, and S.C. Brooks. 2000 Uranyl Surface Species Formed during Reactive Transport through Subsurface Media. Soil Science Society of America. Nov. 5-9, 2000, Minneapolis, Minnesota.

La Force, M.J., S.E. Fendorf, M.O. Barnett, and P.M. Jardine. 2000. Effects of Residence Time on Contaminant Bioavailability. Soil Science Society of America. Nov. 5-9, 2000, Minneapolis, Minnesota.

Mayes, M.A., P.M. Jardine, T.L. Mehlhorn, J.L. Ladd. 2000. Solute displacement through variably saturated laminated silts and sands from arid regions. Geological Society of America. Nov. 9-18,

2000, Reno, Nevada.

Jardine, P.M., T.L. Mehlhorn, I.L. Larsen. 2001. Quantifying time-dependent physical and chemical processes that influence the migration of chelated radionuclides in fractured shale. Fractured Rock 2001. March 26-28, 2001, Toronto, Ontario, Canada.

Mayes, M.A., P.M. Jardine, and T.L. Mehlhorn. 2001. Nonequilibrium mass transfer in fractured saprolite under saturated and unsaturated conditions. Fractured Rock 2001. March 26-28, 2001, Toronto, Ontario, Canada.

Jardine, P.M., M.A. Mayes, T.L. Mehlhorn, and S.C. Brooks. 2001. Reactive transport of chelated radionuclides through weathered shale saprolite: Observations from lab and field experimentation. Goldschmidt 2001 conference. May 20-24, Hot Springs, VA.

Mayes, M.A., P.M. Jardine, T.L. Mehlhorn, M.N. Pace, and B.N. Bjornstad. 2001. Hydrologic processes controlling the transport of radionuclides through the Hanford vadose zone. Unsaturated Zone Interest Group Meeting. July 29 - August 2, 2001. Idaho Falls, ID.

Pace, M.N., P.M. Jardine, M.A. Mayes, T.L. Mehlhorn, and J.M. Zachara. 2001. Unsaturated contaminant transport in undisturbed cores from the Hanford formation, Richland, WA. Unsaturated Zone Interest Group Meeting. July 29 - August 2, 2001. Idaho Falls, ID.

Jardine, P.M., M.A. Mayes, T.L. Mehlhorn, S.C. Brooks, and S.E. Fendorf. 2001. Influence of hydrological and geochemical processes on reactive contaminant transport in fractured subsurface media. Sixth International Conference on the Biogeochemistry of Trace Elements. July 29- August 2, Guelph, Ontario, Canada.

Mayes, M.A., Jardine, P.M., Fendorf, S.E., Mehlhorn, T.L., and Bjornstad, B.N. 2001. Hydrologic and geochemical processes controlling the transport of uranium and cesium through the Hanford vadose zone. American Chemical Society. Chicago, Aug. 26-30.

Barnett, M.O., E.E. Roden, P.M. Jardine, and S.C. Brooks. Biogeochemical interactions of uranium and Fe(III)-oxides in subsurface environments. American Chemical Society. Chicago, Aug. 26-30.

Mayes, M.A., P.M. Jardine, T.L. Mehlhorn, M.N. Pace, Y. Roh, J.L. Ladd, and B.N. Bjornstad. 2001. Hydrologic processes controlling the transport of radionuclides through the Hanford vadose zone. Soil Science Society of America. October 21-25, Charlotte, NC.

Pace, M.N., P.M. Jardine, M.A. Mayes, T.L. Mehlhorn, Y. Roh, J.L. Ladd, and J.M. Zachara. 2001. Unsaturated contaminant transport in undisturbed cores from the Hanford formation, Richland, WA. Soil Science Society of America. October 21-25, Charlotte, NC.

Stewart, M., P.M. Jardine, T.L. Mehlhorn, and M.O. Barnett. 2001. Physical and chemical controls on the bioaccessibility of Cr(III/VI) in soil. Soil Science Society of America. October 21-25, Charlotte, NC.

Doll, W.E., J. Gamey, D.B. Watson, and P.M. Jardine. 2002. Geophysical profiling in support of a nitrate and uranium groundwater remediation study. Symposium on the Application of Geophysics to Engineering and Environmental Problems. March 4-7, 2001, Las Vegas, NV February 10-14,

2002, Environmental and Engineering Geophysical Society, 10 pgs.

Mayes, M.A. , P.M. Jardine, M.N. Pace, S.E. Fendorf, T.L. Mehlhorn, Y. Roh, J.L. Ladd, B.N. Bjornstad 2001. Hydrologic Processes Controlling the Transport of Radionuclides Through the Hanford Vadose Zone. American Geophysical Union. December 10-14, San Francisco, CA.

Fields, M.W., S.L. Carroll, W. Wu, P.M. Jardine, C.S. Criddle, and J. Zhou. 2002. Denitrifying bacteria isolated from groundwater contaminated with nitrate and uranium. American Society of Microbiology. Salt Lake City, Utah. May, 2002.

Watson, D.B., W. E. Doll, T. J. Gamey, and P. M. Jardine. 2002. Use of geophysical profiling to guide groundwater remediation studies. 9th Biennial International Spectrum Conference, U.S. Department of Energy, 4 pgs.

Stewart, M. and P.M. Jardine. 2002. Effects of soil geochemical and physical properties on the bioaccessibility of Cr. SE-GSA Spring Meeting, April 3-5, 2002. Lexington, Kentucky.

Roh, Y., M.A. Mayes, M.N. Pace, S. Choi, J. Chorover, D.H. Phillips, and P.M. Jardine. 2002. Mineralogical characteristics of sediments at Hanford site, Washington. 39<sup>th</sup> annual meeting of The Clay Minerals Society, June 8-12, 2002, Boulder, CO.

Gwo, J.P., and P.M. Jardine. 2002. Multiple scale fluid mass transfer calibration for a fracture flow model. American Geophysical Union, May 28-31, 2002. Washington D.C.

Peter K. Kitanidis, Craig S. Criddle, Jian Luo, Mike Fienen, Jennifer Nyman, Margaret Gentile, Philip Jardine, Jizhong Zhou, Bachua Gu, Matthew Fields, David Watson, Olaf A. Cirpka. 2002. An Effective Delivery and Mixing System of Biostimulation for Remediation of Uranium Contaminated Groundwater at the NABIR Field Research Center at Oak Ridge, TN. Western Region Hazardous Substance Research Center Annual Meeting, August 19-20, 2002, Corvallis, OR.

Jardine, P.M., T.L. Mehlhorn, D.B. Watson, C.S. Criddle, B. Gu, M. Fields, W.E. Doll, T.J. Gamey, and P. Kitanidis. 2002. Rapid movement of an acidic uranium nitrate plume in carbonate-rich weathered shale saprolite. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.

Jardine, P.M. 2002. Soil Chemistry Needs and Expectations at National Laboratory Facilities. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN (Invited).

Mayes, M.A., P.M. Jardine, M. N. Pace, T.L. Mehlhorn, and J.M. Zachara. 2002 The Effects of Unstable Flow on Uranium Transport In Variably Saturated Undisturbed Cores. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.

Adams A., R. Harrison, C. Garten, P. Jardine, C. Licata 2002. Accounting for Carbon Movement and Storage in Pacific Northwest Forests. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.

Kinnsall, B., C. Brandt, H. Gibbs, M. Post, and P. Jardine Regional Estimation of Carbon Immobilization in Surface Soils. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.

- Hanson, P., S. Trumbore, J. Gaudinski, C. Swanston, M. Torn, J. Jastrow, J. Joslin, and P. Jardine. 2002. Enriched Background Isotope Study (EBIS): Application of an Ecosystem-scale  $^{14}\text{C}$  Tracer to Soil-Carbon-Cycle Studies. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.
- Mayes, M., M. Uhle, R. Nesbit, D. Todd, Jr., T. Mehlhorn, and P. Jardine. 2002. Dynamics of Organic Carbon in a Humid Forest Soil Profile. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.
- Adams, A., R. Harrison, R. Sletten, J. Amonette, P. Jardine, C. Licata, F. Bouroncle. 2002 Carbon Movement and Sequestration in Fine- Vs. Coarsed-grained Soils of Managed Douglas-fir Stands. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.
- Pace, M.N., M.A. Mayes, P.M. Jardine, T.L. Mehlhorn, X. Yin, and J.M. Zachara. 2002. Strontium and Uranium Transport through Variably Saturated Undisturbed Cores from the Hanford Formation, Richland, WA. Soil Science Society of America, Nov. 10-14, 2002, Indianapolis, IN.
- M.N. Pace, M.A. Mayes, P.M. Jardine, S.E. Fendorf, T. L. Mehlhorn, X. Yin, J. L. Ladd, J. Teerlink, J.M. Zachara. 2003. Contaminant transport through subsurface material from the DOE Hanford reservation. Division of Environmental Chemistry for the 225th ACS National Meeting, March 23-27, 2003, New Orleans, LA.
- M.A. Mayes, P.M. Jardine, S.E. Fendorf, M.N. Pace, X. Yin, T.L. Mehlhorn, and J.M. Zachara. 2003. Coupled Hydrological and Geochemical Processes Governing the Fate and Transport of Radionuclides and Toxic Metals in the Hanford Vadose Zone. Division of Environmental Chemistry for the 225th ACS National Meeting, March 23-27, 2003, New Orleans, LA.
- Stewart, M.A., P.M. Jardine, T.L. Mehlhorn, M. Barnett, and S.E. Fendorf. 2003 Quantifying the bioaccessibility of Cr and Cd in soils. Annual International Conference on Contaminated Soils, Sediments, and Water. Oct. 21-24, 2003, Amherst, MA.
- Stewart, M.A., P.M. Jardine, S.E. Fendorf, and M.O. Barnett. 2003. Influence of soil properties on the bioaccessibility of Cr(VI) in soils. Soil Science Society of America National Meetings. Nov. 2-6, 2003. Denver, CO.
- Barnett, M. O., J. K. Yang, J. L. Subacz, P. M. Jardine and S. E. Fendorf, 2003. Estimating the oral bioavailability of arsenic in soil. Presented at the U.S. EPA Bioavailability Workshop, April 15-16, Tampa, FL.
- Fields, Matthew W., Susan L. Carroll, Qi Ye, Yul Roh, C. Zhang, Phil M. Jardine, Craig S. Criddle and Jizhong Zhou. 2003. Novel, Iron-Reducing Bacterial Enrichments dominated by Gram-Positive Microorganisms. American Society for Microbiology, 102<sup>th</sup> General Meeting, Salt Lake City, UT.
- Gu, B., W. Wu, M.W. Fields, J. Nyman, M. Gentile, J. Zhou, P. Jardine, and C.S. Criddle. 2003. Uranium(VI) Reduction by Microbial Biomass from a Denitrifying Fluidized-Bed Reactor. American Society for Microbiology, 102<sup>th</sup> General Meeting, Salt Lake City, UT.
- Yin, X., M.A. Mayes, M.N. Pace, P.M. Jardine, S.E. Fendorf, and T.L. Mehlhorn. 2003. Kinetics and mechanisms of Co(II)EDTA oxidation, dissociation, and adsorption on subsurface soils from the Hanford vadose zone. American Chemical Society, September 7-11, New York, NY.

- Todd, D. E., J. A. Tarver, T. L. Mehlhorn, C. Swanston, P. J. Hanson, and P.M. Jardine. 2003. Transport and sequestration of organic C in contrasting soils amended with C-14 enriched leaf litter. Soil Science Society of America, Nov. 2-6, 2003. Denver, CO.
- Mayes, M.A., Pace, M.N., Yin, X., Jardine, P.M., Fendorf, S.E., and Bjornstad, B.N. 2003. Coupled hydrogeochemical processes controlling the transport of U and chelated metals through the Hanford vadose zone. 9<sup>th</sup> Biannual Unsaturated Zone Interest Group meeting, October 8-10, Richland, WA.
- Mayes, M.A., Yin, X., Pace, M.N., and Jardine, P.M. 2003. Coupled hydrology and geochemistry of chelated metals in intact Hanford and ORNL subsurface sediments. American Chemical Society, September 7-11, New York, NY.
- Pace, M.N., M.A. Mayes, P.M. Jardine, S.E. Fendorf, T.L. Mehlhorn, X.P. Yin, J. Ladd, J. Teerlink, and J.M. Zachara. 2003. Contaminant Transport through Subsurface Material from the D.O.E. Hanford Reservation. American Chemical Society Annual Meeting, New Orleans, LA, March 23-27.
- Pace, M.N., M.A. Mayes, R.N. Sparks, P.M. Jardine, S. Fendorf, T.L. Mehlhorn, B.N. Bjornstad, J.M. Zachara. 2003. Coupled Geochemical and Hydrologic Processes Governing Cr(VI) Transport in Hanford Formation Sediments. Geological Society of America. Nov. 2-5. Seattle, WA.
- J. R. Tarver, J. A. Palmer, D. E. Todd, and P. M. Jardine. 2003. Fate and Transport of Dissolved Organic Carbon in Soils from two Contrasting Watersheds. Soil Science Society of America, Nov. 2-6, 2003. Denver, CO.
- Heuscher, S.A., C.C. Brandt, and P.M. Jardine. 2003. Estimating toxic metal bioaccessibility in soils using existing soils data. Soil Science Society of America, Nov. 2-6, 2003. Denver, CO.
- Mehlhorn, T.L., P.M. Jardine, and S.C. Brooks. 2003. Field-scale Transport of Chelated Metals in Contaminated Fractured Shale Bedrock. American Chemical Society, September 7-11, New York, NY.
- Stewart, M.A., P. M. Jardine, S. E. Fendorf, M. O. Barnett. 2003. Influence of soil properties on the bioaccessibility of Cr(VI). Soil Science Society of America, Nov. 2-6, 2003. Denver, CO.
- Kinsall, B.L., Brandt, C., Palmer, J.A. and Jardine, P.M. Estimation of Carbon Immobilization in Subsurface Soils Using Historical Soils Data. American Society of Agronomy-Soil Science Society of America National Meetings. 2003. Denver, CO.
- Fienen, M.N., C. S. Criddle, P. M. Jardine, P. K. Kitanidis, T. L. Mehlhorn, D. B. Watson, and W. Wu (2003) Elution of Nitrate at the NABIR Field Research Center, Oak Ridge Reservation, Oak Ridge, TN. Eos Trans. AGU , 84(46), Fall Meet. Suppl., Abstract H21D-0872

- Fields, M.W., T. Yan, X. Liu, C.E. Bagwell, S.L. Carroll, P.M. Jardine, C.S. Criddle, T.C. Hazen, and J. Zhou. 2004. Polyphasic characterization of microbial communities under the stressful conditions of nitrate, heavy metals, radionuclides, and acidic pH in contaminated groundwater. International Symposium on Microbial Ecology, August 22-27, 2004. Cancun, Mexico.
- Early, T.O., P.M. Jardine, R.H. Ketelle. 2004. The approach to understanding and controlling contaminant fate and transport on the U.S. Department of Energy's Oak Ridge Reservation, Tennessee (USA): A review of status and future challenges. 2004 Fractured Rock Conference. September 13-15, Portland, MA.
- Brooks SC, Jardine PM, Barnett MO, Fendorf S. 2004. Assessing the effects of peat amendments on the mobility of cadmium in soils. The American Chemical Society 227: U1106-U1106 009-GEOC Part 1, MAR 28 2004
- Gentry, Terry, J., Christopher W. Schadt, Weimin Wu<sup>1</sup>, Craig S. Criddle, Jack M. Carley, Jonathan D. Istok, Mandy Sapp, Susan L. Carrol, Tonia L. Mehlhorn, Mary A. Bogle, Bob Hickey, David D. Watson, Philip M. Jardine and Jizhong Zhou. 2004. Use of Integrated Microarray Technologies to Monitor Microbial Communities During the Remediation of a Groundwater System Contaminated with High Levels of Nitrate and Uranium. American Society of Microbiology. May 23-27, 2004. New Orleans, LA.
- Gao, W., Yang, Z., P.M. Jardine, M.W. Fields, and J. Zhou. 2004. Biomass recovery, high-molecular-weight DNA isolation and metagenomic DNA cloning library construction from groundwater and soil samples. American Society of Microbiology. May 23-27, 2004. New Orleans, LA.
- Jardine, P.M., M.A. Mayes, M.N. Pace, T.L. Mehlhorn, X.L. Yin, S.E. Fendorf, and C.S. Criddle. 2004. Exploring contaminant fate and transport processes at multiple scales. Gordon Research Conference. Plymouth New Hampshire. June 27-August 2, 2004.
- Mayes, M.A., M.N. Pace, P.M. Jardine, S.E. Fendorf, X. Yin. 2004. Coupled hydrology and uranium geochemistry of the hanford Caliche layer. AGU Annual Meeting, San Francisco, CA, December 13-17.
- Pace, M.N., M.A. Mayes, P.M. Jardine, X. Yin, T.L. Mehlhorn, Q. Lin, and H. Gurleyuk. 2004. Unraveling the rate and transport of SrEDTA<sup>2-</sup> and Sr<sup>2+</sup> in Hanford sediments. AGU Annual Meeting, San Francisco, CA, December 13-17.
- Fan, Z., G.T. Yeh, J.C. Parker, Y.J. Kim, S.C. Brooks, M.N. Pace, and P.M. Jardine. 2004. A general paradigm of modeling three-dimensional subsurface water quality. AGU Annual Meeting, San Francisco, CA, December 13-17.
- Pace, M.N, Mayes, M.A., Jardine, P.M., Mehlhorn, T.L., Yin, X., Liu, Q., Zachara, J.M.. 2004. Determination of reactive mineralogies in unsaturated strontium transport in undisturbed sandy media. Soil Sci. Soc. Am. Annual Meeting. Seattle, WA. October 2004.
- Stewart, M.A., P. M. Jardine, S. E. Fendorf, M. O. Barnett. 2004. Decreasing the Bioaccessibility of Pb, Cd, and Cr(VI) with Novel Soil Amendment Strategies. Soil Sci. Soc. Am. Annual Meetings; Seattle, Washington, Oct 31 - Nov 4, 2004.

Stewart, M.A., P. M. Jardine, S. E. Fendorf, M. O. Barnett. 2005. Evaluation of Soil Properties to Reduce Bioaccessibility of Heavy Metals. International Conference on the Remediation of Contaminated Sediments; New Orleans, Louisiana, January 24-27, 2005.

Stewart, M.A., P. M. Jardine, S. E. Fendorf, M. O. Barnett. 2005. Use of Soil Amendments to Reduce Bioaccessibility of Heavy Metal Contaminated Soils. 8th International Conference on the Biogeochemistry of Trace Elements; Adelaide, Australia, April 3-7, 2005 (invited).

Gao, W., T.J. Gentry, S.L. Carroll, T.L. Mehlhorn, M.W. Fields, P.M. Jardine, and J. Zhou. 2005. Microbiological characterization of contaminated groundwater at the DOE WAG5 site in Oak Ridge, TN. 105<sup>th</sup> American Society of Microbiology General Meetings, Atlanta, GA, June 5-9, 2005.

Wu, W., J. Carley, M. Ginder-Vogel, T. Gentry, M. Fienen, J. Nyman, E. Tsai, S. Carroll, H. Yan, J. Luo, M. Gentile, T. Mehlhorn, M. Fields, B. Gu, D. Watson, J. Zhou, P.M. Jardine, S. Fendorf, P. Kitanidis, and C.S. Criddle. 2005. Field-demonstration of in situ biological U(VI) reduction at the NABIR Field Research Center, Oak Ridge, TN. 105<sup>th</sup> American Society of Microbiology General Meetings, Atlanta, GA, June 5-9, 2005.

Fields, M.W., T. Yan, X. Liu, C.E. Bagwell, S.L. Carroll, P.M. Jardine, D.B. Watson, C.S. Criddle, T.C. Hazen, and J. Zhou. 2005. Identification of different relationships between contaminated groundwater samples based upon extensive geochemical data or multiple gene sequences from microbial communities. 105<sup>th</sup> American Society of Microbiology General Meetings, Atlanta, GA, June 5-9, 2005.

Gentry, T.J. R.M. Lynch, C.W. Schadt, W. Wu, J.M. Carley, S.L. Carroll, G.S. Wickham, D.B. Watson, P.M. Jardine, C.S. Criddle, M.W. Fields, and J. Zhou. 2005. Microbial population dynamics during field-scale, in situ remediation of uranium and nitrate contaminated groundwater. 105<sup>th</sup> American Society of Microbiology General Meetings, Atlanta, GA, June 5-9, 2005.

Hwang, C., T. Gentry, W. Wu, J. Carley, S.L. Carroll, P.M. Jardine, C.S. Criddle, J. Zhou, and M.W. Fields. 2005. Bacterial community structure of a field demonstration scale denitrifying fluidized bed reactor treating uranium contaminated groundwater. 105<sup>th</sup> American Society of Microbiology General Meetings, Atlanta, GA, June 5-9, 2005.

Kelly, S.D., K.M. Kemner, E.J. O'Loughlin, M.I. Boyanov, D.B. Watson, P.M. Jardine, D.H. Phillips. 2004. "U L<sub>3</sub>-Edge EXAFS Measurements of Sediment Samples from Oak Ridge National Laboratory, Tennessee, U.S.A.," in Advanced Photon Source Activity Report 2003.

Mayes, M.A., Pace, M.N., Fendorf, S.E., Jardine, P.M., and Yin, X. 2005. Uranium hydrogeochemistry of the Hanford caliche layer. 15<sup>th</sup> Annual Goldschmidt Conference, May 20-25, Moscow, ID.

Bank, T.L., P.M. Jardine, M. Ginder-Vogel, S. E. Fendorf, and M. E. Baldwin. 2005. Discerning Geochemical and Biogeochemical Metal Reduction through Gamma Sterilization. 15<sup>th</sup> Annual Goldschmidt Conference, May 20-25, Moscow, ID.

- Subacz, J.L. and J.K. Yang, J. Zhuang, M.O. Barnett, P.M. Jardine, and S.E. Fendorf. 2005. Estimating and reducing As bioaccessibility – bioavailability in soils in the U.S. Dutch National Institute for Public Health and the Environment (RIVM). April 28, Bilthoven, The Netherlands (invited).
- Kelly, S.D., K. Kemner, D.B. Watson, P.M. Jardine, and D.B. Phillips. 2005. Uranium speciation with depth from contaminated sediments. 2005 APS Users Meeting. Argonne, IL May 2-6. Argonne National Laboratory.
- Jardine, P.M. and D.B. Watson. 2005. Techniques for Assessing the Performance of In Situ Bioreduction and Immobilization of Metals and Radionuclides in Contaminated Subsurface Environments The 2005 AGU Joint Assembly. New Orleans, LA. May 23-27, 2005.
- Luo, Jian, Frank-Andreas Weber, Olaf A. Cirpka, Wei-Min Wu, Jennifer L. Nyman, Jack Carley, Philip M. Jardine, Craig S. Criddle, Peter K. Kitanidis. 2005. Modeling in-situ uranium(VI) bioreduction at Oak Ridge, TN. AGU Annual Meeting, San Francisco, CA, December 5-9, 2005.
- Fienen, M.N., J. Carley, C.S. Criddle, P.M. Jardine, P.K. Kitanidis, T.L. Mehlhorn, D.B. Watson, and W.M. Wu. 2005. Tracer test analysis using a Bayesian geostatistical inverse approach to solve for transfer functions. AGU Annual Meeting, San Francisco, CA, December 5-9, 2005.
- Bank, T.L., Jardine, P.M., Phelps, T.J., Ginder-Vogel, M.A., Fendorf, S.E., and Baldwin, M.E. 2005. Elucidating Geochemical and Biogeochemical U(VI) Reduction Via Soil Sterilization at Oak Ridge, Tennessee. AGU Annual Meeting, San Francisco, CA, December 5-9, 2005.
- Subacz, J. L., J. K. Yang, J. Zhuang, M. O. Barnett, P. M. Jardine and S. E. Fendorf (2005). Estimating and Reducing As Bioaccessibility -Bioavailability in Soils in the U.S. Invited seminar, Dutch National Institute for Public Health and the Environment (RIVM), April 28, Bilthoven, The Netherlands.
- Gentry, Terry J., Liyou Wu, Zhijian Huang, Weimin Wu, Christopher W. Schadt, Jack M. Carley, Susan L. Carroll, David B. Watson, Philip M. Jardine, Matthew W. Fields, Craig Criddle and Jizhong Zhou. 2005. Microbial Community Dynamics during the Field-Scale Remediation of Uranium-Contaminated Soil and Groundwater. Soil Sci. Soc. of Am., Salt Lake City, UT. Nov. 6-10, 2005.