

## **A. PAUL SCHWAB**

**Texas A&M University**

**Texas A&M AgriLife**

**College Station, TX 88743**

*Phone: 765-543-9235; email: pschwab@tamu.edu*

### **Education**

Ph.D., Soil Chemistry, 1981, Colorado State University, Ft. Collins, CO

M.S., Soil Chemistry, 1978, Colorado State University, Ft. Collins, CO

B.S., Mineral Engineering – Chemistry, 1976, Colorado School Mines, Golden, CO

### **Professional Experience**

Professor Emeritus, Soil and Crop Sciences, Texas A&M University, College Station, 2012-2021

Senior Research Scientist, Texas Water Resources Institute, 2021

Professor, Soil and Crop Sciences, Texas A&M University, College Station, 2012-2021

Director, Natural Resources and Environmental Science Program, Purdue University, 2008-2012

Professor, Agronomy, Purdue University, West Lafayette, Indiana, 1998-2012

Adjunct Professor, Agronomy, Kansas State University, Manhattan, Kansas, 1998-1999

Adjunct Professor, Division of Biology, Kansas State University, Manhattan, 1996-1999

Professor, Agronomy, Kansas State University, Manhattan, Kansas. 1994-1998

Associate Professor, Agronomy, Kansas State University, Manhattan, Kansas. 1989-1994

Assistant Professor, Agronomy, Kansas State University, Manhattan, Kansas. 1983-1989

Research Scientist, Battelle Pacific Northwest, Richland, Washington. 1981-1983

### **Professional Activities and Affiliations**

Editor-in-Chief, Geochemistry section, *Geosciences*. 2018-present

Editorial Board, *ISRN Soil Science*. 2011-2017

Editorial Board (Founding Member), *Journal of Undergraduate Research* – Purdue University, 2011-2012

Chair, USDA Regional Committee W-1170. 2004-2009

Chair, Division S-11, Soils and Environmental Quality, 2004

Chair, Soil Chemistry Division of Soil Science Society of America, 1998-1999

Associate Editor, *Journal of Environmental Quality*, 1997-2003

Chair, Western Regional Project 82, 1997

Chair, graduate membership committee, Phi Kappa Phi, 1996-1997

Chair, Soil Science Research Award Committee, 1996

Associate Editor, *Soil Science Society of America*, 1988-1995

Editor, *Chemical Equilibrium and Reaction Models*, SSSAJ special publication, 1995

Committee Memberships in Soil Science Society of America:

Nominations committee for Soil Chemistry Division (S111.02), 1999-2001 (chair, 1999)

Soil Science Nominations Committee (S101), 1999

Soil Science Society of America Journal Editorial Board (S302), 1988-1995

Soil Science Research Award, 1995-1996 (chair, 1996)

Program Planning (S711), 1998-1999

Glossary of Soil Science Terms (S374), 1998-2001 (chair, 1999)

Soil Science Society of America Special Awards (S491.2)

Committee Memberships in American Society of Agronomy:

Journal of Environmental Quality Editorial Board (ACS324.1), 1997-2003

Program Planning (A711), 1998-1999

Membership Committee, 1984

Member, Soil Science Society of America  
Member, American Society of Agronomy  
Member, American Chemical Society

### **Professional Honors**

Faculty Research Award, Soil and Crop Sciences, 2021  
Mentor of the Year, Purdue University Learning Communities. 2012  
Fellow, Soil Science Society of Agronomy, 2001  
Fellow, American Society of Agronomy, 1998  
Certificate of Commendation for Poster Presentation, HSRC/WERC Environmental Conference, 1996  
Certificate of Excellence for Educational Material, Amer. Soc. Agron., 1995  
Emil Truog Award for the Outstanding Dissertation in Soil Science, 1982  
Member, Sigma Xi, research honorary  
Member, Phi Kappa Phi  
Member, Gamma Sigma Delta, agriculture honorary

### **Instruction and Student Programs**

#### Courses Texas A&M University

CVEN 685 Kinetics and Thermodynamics of Cementitious Materials (3 credits)  
SCSC 422 Soil Fertilizer and Fertilizers (3 credits)  
SCSC 432 Soil Fertility Laboratory (1 credit)  
SCSC 455/657 Environmental Soil and Water Science (3 credits)  
SCSC 618 Analysis of Environmental Systems (3 credits)  
SCSC 624 Soil Chemistry (3 credits)

#### Undergraduate Courses at Purdue

AGR 122 Natural Resources and Environmental Science Orientation (0.5 credit)  
NRES 200 Introduction to Environmental Careers (1 credit)  
AGRY 290 Introduction to Environmental Science (3 credits)  
NRES 410 Research in Natural Resources and Environmental Science (variable credit)  
NRES 420 Environmental Internship (1 credit)  
AGRY 498 Soil and Groundwater Remediation (3 credits)  
NRES 498 Regulatory Science (3 credits)  
CE 593/AGRY 498 Environmental Geotechnology (3 credits)

#### Graduate Courses at Purdue

AGRY 540 Soil Chemistry (3 credits)  
AGRY 555 Soil and Plant Analysis (3 credits)  
AGRY 598 Soil Physical Chemistry (3 credits)  
AGRY 598 Use of Vegetation in Remediation of Metal Contaminated Soils (3 credits)  
AGRY 598 Phytoremediation (3 credits)

#### Undergraduate Programs

Environmental Sciences Learning Community (Advisor and Instructor), 2011  
Environmental Science Club (Advisor), 2008-2012  
Engineering Projects in Community Service (Faculty Reviewer), 2009-2012

### **National/International Review Activities**

U.S. EPA. Review Panel. Per- and Polyfluoroalkyl Substances in Rural Communities. September 2020.  
USDA AFRI Panel. Foundational Knowledge of Agricultural Production Systems (A1102). October 2016  
CRDF Global. Shota Rustaveli National Science Foundation Research Competitions. Review Panel. July 2016.

American Association for the Advancement of Science Research Competitiveness Service. King Abdulaziz City for Science and Technology Program. 2011-2015.

National Institute of Environmental Health Sciences (NIEHS) Superfund Basic Research and Training Program Review, Nov. 2013.

U.S. Environmental Protection Agency. Federal Insecticide, Fungicide, and Rodenticide Act, Scientific Advisory Panel. Ad hoc member for "Pollinator Risk Assessment Framework." 2012.

American Association for the Advancement of Science, Strategic Technologies Program. 2011.

U.S. Civilian Research and Development Fund. Russian Young Scientists Scientific Paper Competition. 2011.

World Class University (South Korea) Biology/Agriculture Panel Chair. 2011.

U.S. Civilian Research and Development Fund. Panel Chair, Environmental Biology Panel. February, 2009, February 2010.

National Institute of Environmental Health Sciences (NIEHS) ES07-006 Superfund Basic Research and Training Program Review, Nov. 2008, Nov. 2009.

Central Asia Research Travel Grant Competition, CRDF, Washington DC, Feb 2008-2012.

National Science Foundation, Small Business Innovation Research, 2007-2009, Washington DC.

National Science Foundation, Environmental Engineering Review Panel, June 22, 2007, Washington DC.

U.S. Civilian Research and Development Fund. January, 2007.

U.S. Dept. Agriculture National Research Initiative Review Panel. May 16-May 20, 2005.

U.S. Dept. Agriculture National Research Initiative Review Panel. May 17-May 21, 2004.

U.S. Civilian Research and Development Fund. May, 2004.

National U.S. Environmental Protection Agency Review Team, Oil Spill Remediation Research Center. Lake Charles, Louisiana. December, 2003.

U.S. Civilian Research and Development Fund. 2001-2007.

Review Team, Integrated Petroleum Environmental Consortium, Quality Assurance Project Plan. June, 1999.

Remediation Technologies Development Forum, Phytoremediation Action Team. Waterways Experiment Station, Vicksburg, Mississippi. March, 1999.

Research Proposal Review Panel, U.S. Environmental Protection Agency, September, 1998.

Research Proposal Review Panel, Exploratory Environmental Engineering, U.S. Environmental Protection Agency. June, 1998.

Review Panel, U.S. Department of Agriculture Appalachian Soil and Water Conservation Research Laboratory. Beckley, West Virginia. November, 1997.

### **Funded Research Grants (appx \$12 million total)**

Concrete and composites: experiments and modeling for army applications. U.S. Army Corps of Engineers ERDC Program. 2021-2026. Z.C. Grasley (PI), J.N. Reddy, J.W. Bullard, D. Little, T. Lacy, A. Srinivasa, J. Wilkerson, and A.P. Schwab. \$2,635,000 (\$275,000 to Schwab).

Kinetics of dissolution and growth at water-mineral surfaces. Texas A&M Triads for Transformation. 2020-2021. P.A. Balbuena (PI), J.W. Bullard, and A.P. Schwab. \$30,000. (\$18,000 to Schwab)

Multi-functional and sustainable materials for 3D-printing environmentally adaptive resilient buildings. 2018-2020. Texas A&M X-Grants. \$498,778. (\$124,000 to Schwab)

Investigating the Unconfined Aquifer as the Source of Low-pH in 5 Surface Waters at Oak Hill Mine. Luminant Environmental Research Program. September 2015 - December 2018. \$209,682.

Chemical speciation and natural attenuation of arsenic, antimony, and heavy metals in soils and sediments contaminated by mine tailings. Texas A&M University-CONACYT: Collaborative Research Grant Program. Sep 2016-Aug 2017. Y. Deng, M.A. Armienta, A.P. Schwab, M. Newville, F.M. Michel, F.M. Romero. \$24,000. (\$5,000 to Schwab)

Environmental Management for the Oil Sector. USAID/Uganda. A.P. Schwab, Lead Investigator. 2014-2017. \$1,200,000. (\$600,000 to Schwab)

Chemical speciation and natural attenuation of arsenic, antimony, and heavy metals in soils and sediments contaminated by mine tailings. A.P. Schwab, M. Newville, and F. M. Romero. Texas A&M University-CONACYT Collaborative Research Grant Program. \$24,000. September 1, 2013-December 31, 2014.

The evaluation of precast concrete sewer pipes, tanks, and vaults exposed to microbially induced concrete corrosion. National Precast Concrete Association. J. Weiss, M.K. Banks, and A.P. Schwab. 2011-2012. \$135,000.

The use of trees and other vegetation in the remediation of brownfields: Big Marsh property of Lake Calumet Area. Great Lakes Restoration Initiative, U.S. Forest Service, Dept. of Interior. A.P. Schwab. 2010-2012. \$193,595.

Revitalization and remediation of abandoned gas stations in Chicago. Chicago Dept. of Environment. F. Whitehead, D. Graham., and A.P. Schwab. 2010-2012. \$100,000. (In Cooperation with School of Art Institute of Chicago and Chicago State University). 2010-2012

Reclamation of steel mill slag. US Steel Corporation (Gary Indiana Works). A.P. Schwab. 2007-2010. \$25,000.

Evaluation of toxicity analysis for foundry sand specifications, Indiana Dept of Transportation, Joint Transportation Research Program. A.P. Schwab and M.K. Banks. 2008-2009. \$25,485.

Soil amendments to reduce bioavailability of metals in soils: Experimental studies and spectroscopic verification, DoD SERDP. M.K. Banks, A.P. Schwab, C. Johnston, and D. Schulze. 2004-2008. \$895,000.

Use of plants for remediation of dredged sediments: Optimization for PCB and PAH degradation. US EPA. A. P. Schwab and C. Rugh. 2004-2005. \$100,000.

Dewatering, remediation, and evaluation of contaminated dredged sediments. US EPA. A.P. Schwab, M.K. Banks, and L. Newman. 2001–2004. \$140,000.

Treatment of slag leachate with constructed wetlands, Indiana Department of Transportation. M.K. Banks, J. Alleman, and A. P. Schwab. 2001-2003, \$85,000.

Remediation and stabilization of soils contaminated by lead resulting from the removal of paint from bridges. Indiana Department of Transportation. M.K. Banks and A.P. Schwab. 2001-2004. \$150,000.

Development of an integrated biotoxicity protocol for biosolids. Water Environment Research Foundation. M.K. Banks, A.P. Schwab, J. Alleman, and M. Switzenbaum. 2000-2003. \$250,000.

The impact of soil chemical properties on the bioavailability and chemical lability of selected, organic priority pollutants. U.S. Environmental Protection Agency. A.P. Schwab, L. Lee, and M.K. Banks. 1998-2000. \$196,000.

Field validation of an optimal design methodology for vegetative remediation of sediments from the Central Vehicle Wash Facility, Custer Hill, Fort Riley, Kansas. Environmental Security Technology Certification Program, Department of Defense. A.P. Schwab, J.C. Tracy, and L.E. Erickson. 1997-1999. \$248,750.

The effects of plants on the bioavailability and toxicity of contaminants in soil. U.S. Environmental Protection Agency. M.K. Banks, A.P. Schwab, and S. Smith. 1996-1999. \$499,941.

Evaluation of lagoons for the containment of waste in western Kansas. Kansas Department of Health and Environment. A.P. Schwab, L.N. Reddi, J. Ham, and M.K. Banks. 1996-1997. \$140,000.

Phytoremediation of soil contaminated with hazardous chemicals. Applied Technology Demonstration Facility, Department of Defense. M.K. Banks, A.P. Schwab, and R.S. Govindaraju. 1995-1997. \$471,889.

Fate and transport of heavy metals in contaminated soils. U.S. Environmental Protection Agency. A.P. Schwab, M.K. Banks, L.E. Erickson, and J.C. Tracy. 1995-1998. \$220,476.

Acquisition of high performance liquid chromatograph and gas chromatograph mass spectrometer for studying dissipation of organic chemicals. National Science Foundation. A.P. Schwab, M.K. Banks, J. Blair, F. Oehme, and J. Pickrell. 1994-1995. \$184,647.

Kansas EPA EPSCoR - Enhancement of bioremediation research. U.S. Environmental Protection Agency. A.P. Schwab. 1994-1996. \$882,000.

Row crop pollution control demonstration project. Kansas Department of Health and Environment. C. Rice, P. Barnes, L. Maddux, and A.P. Schwab. 1990-1994. \$90,000.

Mycorrhizal mediation of grassland biotic interactions and plant community structure. National Science Foundation. D. Hartnett, B.A. Hetrick, and A.P. Schwab. 1994-1997. \$330,000.

Bioremediation of petroleum contaminated soil using vegetation - a technology transfer project. U.S. Environmental Protection Agency. M.K. Banks, A.P. Schwab, and R.S. Govindaraju. 1993-1996. \$260,036.

Row crop pollution control demonstration project. Atrazine analyses. Kansas Department of Health and Environment. A.P. Schwab, C. Rice, P. Barnes, and L. Maddux. 1991-1994. \$25,620.

Denitrifier ecology in stratified soil profiles: Implication for water quality. USDA National Research Initiative Grant. C. Rice, A.P. Schwab, and G. Kluitenberg. 1991-1993. \$119,374.

Biotic and abiotic factors controlling nitrogen flux in pristine and agricultural subsurface systems. National Science Foundation. A.P. Schwab, C. Rice, W.K. Dodds, M.K. Banks, and J.K. Koelliker. 1992-1995. \$594,965.

Coal Ash Reclamation Without Soil. Kansas City Power and Light Company. A.P. Schwab and P.D. Ohlenbusch. 1991-1992. \$50,000.

Bioremediation of hydrocarbon contaminated soils using vegetation: A field and greenhouse study. Conoco, Inc. M.K. Banks, A.P. Schwab, and B.A.D. Hetrick. 1991-1992. \$19,000.

Impact of soil microflora on revegetation efforts in southeast Kansas. U.S. Environmental Protection Agency. M.K. Banks, A.P. Schwab, and B.A.D. Hetrick. 1991-1994. \$203,000

Food and Agricultural Science National Needs Graduate Fellowship Program. U.S. Department of Agriculture. A.P. Schwab, G. Kluitenberg, and C. Rice. 1991-1995. \$108,000.

Mycorrhizal mediation of plant competition and community structure. National Science Foundation. D. Hartnett, B.A.D. Hetrick, A.P. Schwab, and D.J. Gibson. 1991-1993. \$278,000.

Reducing heavy metal availability to perennial grasses and row-crops grown on contaminated soils and mine spoils. U.S. Environmental Protection Agency. G. Pierzynski and A.P. Schwab. 1990-1993. \$42,000.

Leaching of atrazine, alachlor, and nitrate through soil and into groundwater. A.P. Schwab and G. Kluitenberg. Kansas Water Resources Research Institute. 1991-1992. \$14,500

Leaching of atrazine, alachlor, and nitrate through soil and into groundwater. A.P. Schwab and R. Greenland. Kansas Water Resources Research Institute. Apr 1990 - Mar 1991. \$14,600.

Leaching of atrazine and nitrate through soil and into groundwater. Kansas Water Resources Research Institute. A.P. Schwab. 1989-1990. \$17,600.

Ash reclamation for Kansas City Power and Light. P. Ohlenbusch and A.P. Schwab. 1987-1990. \$324,019.

Chemical and microbial degradation rate of atrazine in ground water systems. U.S. Geological Survey. A.P. Schwab. 1987-1990. \$120,000.

Movement of nitrate and atrazine in Kansas soils. Kansas Water Resource Research Institute. A.P. Schwab. 1987-1988. \$22,000.

Development of a phosphorus soil test for low input systems. U.S. Department of Agriculture. A.P. Schwab and S.J. Thien. 1988-1990. \$36,000.

### **Peer-Reviewed Publications (134 total)**

Schwab, A.P., Dermody, C.L. 2021. Pathways of polycyclic aromatic hydrocarbons assimilation by plants in growing in contaminated soils. *Advances in Agronomy*. 169:193-250.

- Grajales, J.A., L.M. Perez, A.P. Schwab, D.N. Little. 2021. Quantum chemical modeling of the effects of hydrated lime (calcium hydroxide) as a filler in bituminous materials. ACS Omega. <https://doi.org/10.1021/acsomega.0c05519>
- Girgin, G., J.P. Muir, R.W. Jessup, A.P. Schwab. 2020. *Dalea aurea*, *D. candida*, *D. multiflora* and *D. purpurea* seedling herbage and root nitrogen and dry matter yield as influenced by soil type, phosphorus amendment and cowpea Rhizobium inoculant. Native Plants J. 21 (3), 341-352
- Pandey A., F. Dou, C.L.S. Morgan, J. Guo, J. Deng, P. Schwab. Organically fertilized flooded rice systems and its long-term effects on grain yield and methane emissions. Sci. Total Environ. 755: 145278. <https://doi.org/10.1016/j.scitotenv.2020.142578>
- Akula, P., D. Little, A.P. Schwab. 2020. Thermodynamic evaluation of smectite treated with hydrogen ion stabilizer. J. Matl. Civ. Engg. 32: 04020098 doi.org/10.1061/(ASCE)MT.1943-5533.0003186
- Banerjee, S., A. Bajpayee, M.F. Bakhsh, U. Zakira, A. Pandey, L.A. Ennab, Z. Rybokowski, M.K. Dixit, A.P. Schwab, N. Kalantar, B. Birgisson. 2020. In situ resource utilization and reconfiguration of soils into construction materials for the additive manufacturing of buildings. Frontiers in Materials. Volume 7, article 52 <https://doi.org/10.3389/fmats.2020.00052>
- Xu, Y, N. Porter, J. Foster, J. Muir, A.P. Schwab, B. Burson, R.W. Jessup. 2020. Silica production across candidate lignocellulosic biorefinery feedstocks. Agronomy 10(1) article 82
- Iqbal, A., M. Arshad, R. Karthikeyan, T.J. Gentry, J. Rashid, I. Ahmed, A.P. Schwab. 2019. Diesel degrading bacterial endophytes with plant growth promoting potential isolated from a petroleum storage facility. 3 Biotech. 9:35. <https://doi.org/10.1007/s13205-018-1561-z>
- Tahtouh, J., R. Mohtar, A. Assi, A.P. Schwab, A. Jantrania, Y. Deng, C. Munster. 2019. Impact of brackish groundwater and treated wastewater on soil chemical and mineralogical properties. Sci. Total Environ. 647:99-109
- Ahmad, I., Khan, B. Khan, S. Khan, M.T. Khan, and A.P. Schwab. 2018. Assessment of lead exposure among automobile technicians in Khyber Pakhtunkhwa, Pakistan. Science of the Total Environment. 633:293-299. <https://doi.org/10.1016/j.scitotenv.2018.03.160>
- Rossi, L., W. Zhang, A.P. Schwab, and X. Ma. 2018. Mutual effects and in planta accumulation of co-existing cerium oxide nanoparticles and cadmium in hydroponically grown soybean (*Glycine max* (L.) Merr.) Environ. Sci: Nano DOI 10.1039/C7EN00931C
- Fancher, J.P., J.A. Aitenhead-Peterson, T. Farris, K. Mix, A.P. Schwab, D.J. Wescott, and M.D. Hamilton. 2017. An evaluation of soil chemistry in human cadaver decomposition islands: Potential for estimating postmortem interval (PMI). Forensic Science International 279:130-139
- Iqbal, A., A. Muhammad, I. Hashmi, R. Karthikeyan, T.J. Gentry, A.P. Schwab. 2017. Biodegradation of phenol and benzene by endophytic bacterial strains isolated from refinery wastewater-fed *Cannabis sativa*. J. Environ. Toxicol. 39:1705-1714. <http://dx.doi.org/10.1080/09593330.2017.1337232>
- Mao, Y., M. Sun, X. Chen, Y. Feng, J. Wan, K. Liu, D. Tian, M. Liu, J. Wu, A.P. Schwab, X. Jiang. 2017. Feasibility of sulfate-calcined eggshells for removing pathogenic bacteria and antibiotic resistance genes from landfill leachates. Waste Management <http://dx.doi.org/10.1016/j.wasman.2017.03.005>
- Rossi, Lorenzo; W. Zhang, A.P. Schwab, X. Ma. 2017. Uptake, accumulation and in-plant distribution of co-existing cerium oxide nanoparticles and cadmium in *Glycine max* (L.) Merrill. Environ. Sci. Technol. 51:12815-12824.
- Sun, M., M. Ye, K. Liu, A.P. Schwab, M. Liu, J. Jiao, Y. Feng, J. Wan, D. Tian, J. Wu, J. Li, F. Hu, X. Jiang. 2017. Dynamic interplay between microbial denitrification and antibiotic resistance under enhanced anoxic denitrification condition in soil. Environ. Pollut. 222:583-591.
- Zhang, W.C., C. Musante, J.C. White, A.P. Schwab, Q. Wang, S.D. Ebbs, X. Ma. 2017. Bioavailability of cerium oxide nanoparticles to *Raphanus sativus* L. in two soils. Plant Physiol Biochem. 110:185-193. <http://dx.doi.org/10.1016/j.plaphy.2015.12.013>

- Mao, Y., M. Sun, Y.F. Feng, X. Li, A.P. Schwab, J.Z. Wan, M.Q. Liu, D. Tian, K. Liu, Ju. Wu, X. Jiang. 2016. Calcined eggshell waste for mitigating soil antibiotic-resistant bacterial/antibiotic resistance gene dissemination and accumulation in bell pepper. *J. Ag. Food Chem.* 64: 5446-5453. <http://pubs.acs.org/doi/abs/10.1021/acs.jafc.6b00866>
- Sun, M., M. Ye, A.P. Schwab, X. Li, J. Wan, Z. Wei, J. Wu, V-P. Friman, K. Liu, D. Tian, M. Liu, H. Li, F. Hu, X. Jiang. 2016. Human migration activities drive the fluctuation of ARGs: case study of landfills in Nanjing, eastern China. *Journal of Hazardous Materials* 315:93-101 <http://dx.doi.org/10.1016/j.jhazmat.2016.04.077>
- Ding, N., J. Xu, and A.P. Schwab. 2013. Accumulation and transformation of PCBs in ryegrass (*Lolium multiflorum* L.) In J. Xu, J. Wu, Y. He (eds), *Functions of Natural Organic Matter in Changing Environment, Part IV*. Springer Netherlands, Amsterdam. pp 637-640.
- Martin, W.A., L.S. Lee, and A.P. Schwab, 2013. Antimony migration trends from a small arms firing range compared to lead, copper, and zinc. *Science of the Total Environment* 463-464:222-228.
- Schwab, A.P. 2012. Pollutants: Organic and Inorganic. In SE Jorgensen (ed). *Encyclopedia of Soils in the Environment*. CRC Press.
- Schwab, A.P. Soil Solution. 2012. Soil Solution. In PM Huang, Y. Li, and ME Sumner (editors). *Handbook of Soil Sciences, Second Edition*. Chapter 12. 22 pp Taylor and Francis Publishers
- Kang, D.H., A.P. Schwab, C.T. Johnston, and M.K. Banks. 2010. Adsorption of iron cyanide complexes onto clay minerals, manganese oxide, and soil. *J. Environ. Sci. Health.* 45:1391-1396.
- Nedunuri, K., A.P. Schwab, and R.S. Govindaraju. 2010. Modeling the transport of lead within contaminated soils amended with phosphates, *Ecosystem Management and Restoration Track, Nonpoint source pollution and remediation – II, Proceedings of the ASCE EWRI conference on 3<sup>rd</sup> International Perspective on Current and Future State of Water Resources and the Environment*, pp 1-9, January 5-7, 2010, IIT Madras, Chennai, India. 9 pp.8
- Smith, K.E., M.K. Banks, and A.P. Schwab 2009. Dewatering of contaminated sediments. *Greenhouse and field studies. Ecol. Engg.* 35:1523-1528.
- Cofield, N., M.K. Banks, A.P. Schwab. 2008. Lability of polycyclic aromatic hydrocarbons in the rhizosphere. *Chemosphere* 70:1644-1652.
- Euliss, K, Chi-hua Ho, A.P. Schwab, S. Rock, M.K. Banks. 2008. Greenhouse and field assessment of phytoremediation for petroleum contaminants in a riparian zone. *Bioresour. Technol.* 99:1961-1971.
- Kang, D.H., L.Y.. Hong, A.P. Schwab, and M.K. Banks. 2008. Plant germination and growth after exposure to cyanide complexes. *J. Environ. Sci. Health Part A* 43:627-632.
- Kang, Dong-Hee, D. Tao, F. Wang-Cahill, S. Rock, A.P. Schwab, and M.K. Banks. 2008. Assessment of landfill leachate volume and concentrations of cyanide and fluoride during phytoremediation. *Bioremed. J.* 12:35-48.
- Keller, J., M.K. Banks, A.P. Schwab. 2008. Effect of soil depth on phytoremediation efficiency for petroleum contaminants. *J. Environ. Sci. Health Part A.* 43:1-9.
- Hong, L.Y., M.K. Banks, and A.P. Schwab. 2008. Removal of cyanide contaminants from rhizosphere soil. *Bioremed. J.* 12:210-215.
- Schwab, A.P., D.S. Zhu, and M.K. Banks. 2008. Influence of organic acids on the transport of heavy metals in soils. *Chemosph.* 72:986-994.
- Smith, K.E., A.P. Schwab, M.K. Banks. 2008. Dissipation of PAHs in saturated, dredged sediments: A field trial. *Chemosph.* 72:1614-1619.
- Cofield N., A.P. Schwab, M.K. Banks. 2007. Phytoremediation of polycyclic aromatic hydrocarbons in soil: Part I. Dissipation of target contaminants. *Internat. J. Phytorem.*9:355-370.
- Cofield N., A.P. Schwab, P. Williams, M.K. Banks. 2007. Phytoremediation of polycyclic aromatic hydrocarbons in soil: Part II. Impact on ecotoxicity. *Internat. J. Phytorem.*9:371-384.
- Cofield, N., M.K. Banks, A.P. Schwab. 2007. Evaluation of hydrophobicity in PAH-contaminated soils during phytoremediation. *Environ. Pollut.* 145:60-67.

- Kang, D.H., L.Y. Hong, A.P. Schwab, and M.K Banks. 2007. Removal of Prussian blue from soil in the rhizosphere of cyanogenic plants. *Chemosphere* 69:1492-1498.
- Schwab, A.P., D. Zhu, and M.K. Banks. 2007. Heavy metal transport from mine tailings as affected by organic amendments. *Bioresour. Technol.* 98:2935-2941.
- Smith, K.W., A.P. Schwab, and M.K. Banks. 2007. Phytoremediation of polychlorinated biphenyl (PCB)-contaminated sediment: a greenhouse feasibility study. *J. Environ. Qual.* 36:239-244.
- Banks, M. K., and A. P. Schwab. 2006. Ecotoxicity of pentachlorophenol in contaminated soil as affected by soil type. *J. Environ. Sci. Health Pt. A* 41:117-128.
- Banks, M. K., A.P. Schwab, N. Cofield, J.A. Alleman, M. Switzenbaum, J. Shalabi, and P. Williams. 2006. Biosolids amended soils: Part I. Effect of biosolids application on soil quality and ecotoxicity. *Water Environ. Resear.* 78:2217-2230.
- Banks, M.K., A.P. Schwab, and C. Henderson. 2006. Leaching and reduction of chromium in soil as affected by soil organic content and plants. *Chemosphere* 62:255-264.
- Schwab, A. P., K. Lewis, and M.K. Banks. 2006. Biosolids amended soils: Part II. Chemical lability as a measure of contaminant bioaccessability in biosolids amended soils. *Water Environ. Resear.* 78:2231-2243.
- Schwab, A. P., M. K. Banks, and W. Kyle. 2006. Heritability of phytoremediation potential for the alfalfa cultivar riley in petroleum contaminated soil. *Water Air Soil Pollut.* 177:239-249.
- Schwab, A. P., P.A. Splichal, and M.K. Banks. 2006. Persistence of atrazine and alachlor in groundwater aquifers and soil. *Water Air Soil Pollut.* 171:203-235.
- Schwab, A.P., J. Hickey, J.G. Hunter, and M.K. Banks. 2006. Characteristics of blast furnace slag leachate produced under reduced and oxidized conditions. *J. Environ. Sci. Health Part A.* 41:381-395.
- Schwab, A.P., K. Lewis, and M.K. Banks. 2006. Lead stabilization by phosphate amendments in soil impacted by paint residue. *J. Environ. Sci. Health Part A.* 41:359-368.
- Schwab, A.P., P. Splichal, and M.K. Banks. 2006. Adsorption of atrazine and alachlor to aquifer material and soil. *Water Air Soil Pollut.* 177:119-134.
- Euliss, K., A.P. Schwab, and M.K. Banks. 2005. Silica content of plants as an indirect measure of transpiration rate. *Ecol. Engg.* 25:343-348
- Euliss, K., A.P. Schwab, and M.K. Banks. 2005. Establishing plants under water for the purpose of dewatering contaminated dredged sediments. Paper C6-06, *Proceedings of the Third International Conference on Remediation of Contaminated Sediments*, Battelle Press, Columbus, OH, 2005.
- Parrish, Z., M.K. Banks, and A.P. Schwab. 2005. Assessment of contaminant lability during phytoremediation of polycyclic aromatic hydrocarbon impacted soil. *Environ. Pollut.* 137:187-197.
- Parrish, Z.D., M.K. Banks, and A.P. Schwab. 2005. Effect of root death and decay on dissipation of polycyclic hydrocarbons in the rhizosphere of *Melilotus officinalis* and *Festuca arundinacea*. *J. Environ. Qual.* 34:207-216.
- Schwab, A. P., Y. He, and M. K. Banks. 2005. Influence of organic acids on retention of lead in soil. *Chemosph.* 61:856-866.
- Spriggs, T., M.K. Banks, and A.P. Schwab 2005. Phytoremediation of polycyclic aromatic hydrocarbons in manufactured gas plant-impacted soil. *J. Environ. Qual.* 34:1755-1762
- Parrish, Z.D., M.K. Banks, and A.P. Schwab. 2004. Effectiveness of phytoremediation as a secondary treatment for polycyclic aromatic hydrocarbons (PAHs) in composted soil. *Internat. J. Phytorem.* 6:119-137.
- Schwab, A.P., Y. He, and M.K. Banks. 2004. Influence of citrate on adsorption of zinc in soils. *J. Environ. Engg.* 130:1180-1187
- Sonon, L. and A.P. Schwab. 2004. Transport and persistence of nitrate, atrazine, and alachlor in large, intact soil columns under two levels of water saturation. *Soil Sci.* 169:541-553

- Banks, M.K., P. Kulakow, A.P. Schwab, Z. Chen, and K. Rathbone. 2003. Degradation of crude oil in the rhizosphere of *Sorghum bicolor*. *Internatl. J. Phytorem.* 5:223-234.
- Banks, M.K., A.P. Schwab, B. Liu, P. Kulakow, J. S. Smith, and R. Kim. 2003. The Effect of Plants on the Degradation and Toxicity of Petroleum Contaminants in Soil: A Field Assessment. *In* D. Tsao (ed.), *Advances in Biochemical Engineering and Biotechnology: Phytoremediation Technologies*.78:75-96. Springer-Verlag.
- Chen, Y.C., M.K. Banks, and A.P. Schwab. 2003. Pyrene degradation in the rhizosphere of tall fescue (*Festuca arundinacea*) and switchgrass (*Panicum virgatum* L.). *Environ. Sci. Technol.* 37:5778 - 5782.
- Hutchinson, S.L., A.P. Schwab, and M.K. Banks. 2003. Bioremediation of petroleum hydrocarbons in the rhizosphere. *In* *Phytoremediation: Transformation and Control of Contaminants*. Steven C. McCutcheon and Jerry L. Schnoor (eds.) pp. 355-386
- Schwab, A.P. 2003. "Inorganic and organic pollutants." *Encyclopedia of Soils in the Environment*. Elsevier. pp. 189-194
- Schwab, A.P. 2003. Pollutants, Organic and Inorganic. *In* Lal, Rattan (ed. ) *Encyclopedia of Soil Science*. pages. 1-4. Marcel Dekker, NY.
- Hutchinson, S.L., A.P. Schwab, and M.K. Banks. 2001. Phytoremediation of aged petroleum sludge: Effect of irrigation techniques and scheduling. *J. Environ. Qual.* 30:1516-1522.
- Hutchinson, S.L., M.K. Banks, and A.P. Schwab. 2001. Phytoremediation of petroleum sludge: Effect of inorganic fertilizer. *J. Environ. Qual.* 30:395-403.
- Liu, B., M.K. Banks, and A.P. Schwab. 2001. Effects of soil water content on biodegradation of phenanthrene in a mixture of organic contaminants. *Soil Sediment Contam.* 10:633-658.
- Siciliano, S. D., N. Fortin, A. Mihoc, G. Wisse, S. Labelle, D. Beaumier, R.R. Ouellette, LG. Whyte, M.K. Banks, A.P. Schwab, L. Lee, and C. W. Greer. 2001. Selection of specific endophytic bacterial genotypes by plants in response to soil contamination. *Appl. Environ. Microbiol.* 67:2469-2475.
- Nedunuri, K., R.S. Govindaraju, M.K. Banks, A.P. Schwab, and Z. Chen. 2000. Evaluation of phytoremediation for field-scale degradation of total petroleum hydrocarbons. *J. Environ. Engg.* - ASCE 126:483-490.
- Kulakow, P.A., A.P. Schwab, M.K. Banks. 2000. Screening plant species for growth on weathered, petroleum hydrocarbon-contaminated sediments. *Inter. J. Phytorem.* 2(4):297-317.
- Banks, M.K., E. Lee, and A.P. Schwab. 1999. Evaluation of dissipation mechanisms for benzo[a]pyrene in the rhizosphere of tall fescue. *J. Environ. Qual.* 28:294-298.
- Schwab, A.P. 1999. Chapter 3. Soil Solution. *In* M. Sumner (Ed.) *Handbook of Soil Science*, CRC, Boca Raton, FL. pp B-85 to B-122.
- Schwab, A.P. and M.K. Banks. 1999. Phytoremediation of petroleum contaminated soils: A field study. *In* *Bioremediation of Contaminated Soils*. p. 783-795. *Agronomy Monograph* 37. ASA, CSSA, and SSSA, Madison, WI.
- Schwab, A.P., J. Su, S. Wetzal, S. Pekarek, and M.K. Banks. 1999. Extraction of petroleum hydrocarbons from soil by mechanical shaking. *Environ. Sci. Tech.* 33:1940-1945.
- Zhu, D., A.P. Schwab, and M.K. Banks. 1999. Heavy metal leaching from mine tailings as affected by plants. *J. Environ. Qual.* 28:1727-1732
- Davis, L.C., M.K. Banks, A.P. Schwab, M. Narayanan, L.E. Erickson, and J.C. Tracy. 1998. Research and development on remediation processes with vegetation. *In* S.K. Sikdar (Ed.) *Bioremediation: Principles and Practice*. Technomic Publishing, Lancaster, Pa. pp. 183-219.
- Kalita, P.K., G.J. Kluitenberg, P.L. Barnes, A.P. Schwab, J.K. Koelliker, J.M. Steichen, M.J. Borah, and D.L. Oard. 1998. A monolithic weighing lysimeter for characterizing the fate and transport of agricultural chemicals in soils. *Appl. Engg. Agric.* 14:485-491.
- Schwab, A.P., A.A. Al-assi, M.K. Banks. 1998. Adsorption of naphthalene to plant roots. *J. Environ. Qual.* 27:169-174.

- Wiltse, C.C., W.L. Rooney, Z. Chen, A.P. Schwab, and M.K. Banks. 1998. Greenhouse evaluation of agronomic and crude oil-phytoremediation potential among alfalfa genotypes. *J. Environ. Qual.* 24:169-173.
- Mahmoudjafari, M., G.J. Kluitenberg, J.L. Havlin, J.B. Sisson, and A.P. Schwab. 1997. Spatial variability of nitrogen mineralization at the field scale. *Soil Sci. Soc. Am. J.* 61:1214-1220.
- Wetzel, S., M.K. Banks, and A.P. Schwab. 1997. Effects of the rhizosphere on the degradation of pyrene and anthracene in soil. *In* E.L. Kruger, T.A. Anderson, and J.R. Coats. (Eds.) *Phytoremediation of Soil and Water Contaminants*. Amer. Chem. Soc. Symposium Series 664. pp 254-263.
- Cunningham, S.D., T.A. Anderson, A.P. Schwab, and F.C. Hsu. 1996. Phytoremediation of soils contaminated with organic pollutants. *Advances in Agron.* 56:56-114.
- Fisher-Walter, L.E.F., D.C. Hartnett, B.A.D. Hetrick, and A.P. Schwab. 1996. Interspecific nutrient transfer in a tallgrass prairie community. *Amer. J. Botany.* 83:180-184.
- Govindaraju, R.S., J.K. Koelliker, M.K. Banks, and A.P. Schwab. 1996. Comparison of spatial variability of infiltration properties at two sites in the Konza Prairie. *J. Hydrol. Engg.* 1(3):131-138.
- Reddi, L., G. Reick, A.P. Schwab, L. Chou, and L.T. Fan. 1996. Stabilization of phenolics in foundry waste using cementitious materials. *J. Haz. Matls.* 45:89-106.
- Reilley, K., M.K. Banks, and A.P. Schwab. 1996. Dissipation of polycyclic aromatic hydrocarbons in the rhizosphere. *J. Environ. Qual.* 25:212-219.
- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1995. The effects of organic acids on the leaching of heavy metals from mine tailings. *J. Haz. Matls.* 41:135-145.
- Schwab, A.P., M.K. Banks, and M. Arunuchalam. 1995. Influence of rhizosphere on the biodegradation of phenanthrene and pyrene. *In* R.E. Hinchee and R.F. Olfenbuttel (eds). *On-site bioreclamation*. Butterworth and Heinemann. 3:23-31.
- Shetty, K.G., B.A.D. Hetrick, and A.P. Schwab. 1995. Effects of mycorrhizae and fertilizer amendments on plant zinc tolerance. *Environ. Pollut.* 86:181-188.
- Schwab, A.P. 1995. Application of chemical equilibrium modeling to leachates from coal ash. *In* Loeppert, R., A.P. Schwab, and S. Goldberg, eds. *Chemical Equilibrium Models*, SSSA Special Publication 42, pp. 143-161. American Society of Agronomy, Madison, Wisconsin.
- Sonon, L.S., and A.P. Schwab. 1995. Adsorption characteristics of atrazine and alachlor in Kansas soils. *Weed Sci.* 43:461-466.
- Abdel-saheb, I., A.P. Schwab, M.K. Banks, and B.A. Hetrick. 1994. Chemical characterization of a heavy-metal contaminated soil in southeast Kansas. *Water Air Soil Pollut.* 78:73-82.
- Banks, M.K., A.P. Schwab, G.R. Fleming, and B.A. Hetrick. 1994. Effects of rhizosphere microflora on leaching of Zn from mine tailings. *Chemosphere* 29:1691-1699.
- Banks, M.K., C.Y. Waters, and A.P. Schwab. 1994. Influence of organic acids on leaching of heavy metals from contaminated mine tailings. *J. Environ. Sci. Health.* A29:1045-1056.
- Erickson, L.E., M.K. Banks, L.C. Davis, A.P. Schwab, and J.C. Tracy. 1994. Using vegetation to enhance in situ bioremediation. *Environ. Progress.* 13:226-231.
- Hetrick, B.A.D., G.W.T. Wilson, and A.P. Schwab. 1994. Mycorrhizal activity in warm- and cool-season grasses: variation in nutrient uptake strategies. *Can. J. Bot.* 72:1002-1008.
- Schwab, A.P. and M.K. Banks. 1994. Biologically mediated dissipation of polyaromatic hydrocarbons in the root zone. *In* Anderson, T.A. and J.R. Coats. *Bioremediation through Rhizosphere Technology*. Amer. Chem. Soc. Symp. Ser. 563. pp.132-141.
- Shetty, K.G., B.A.D. Hetrick, D. Hoobler, and A.P. Schwab. 1994. Effects of mycorrhizae and other soil microbes on revegetation of heavy metal contaminated mine spoil. *Environ. Pollut.* 86:181-188.
- Shetty, K.G., M.K. Banks, B.A. Hetrick, and A.P. Schwab. 1994. Biological characterization of a southeast Kansas mining site. *Wat. Air Soil Poll.* 78:169-177.
- Banks, A.P. and A.P. Schwab. 1993. The benefits of vegetation in the bioremediation of hydrocarbons: A review. *Air Waste Manag.* vol. 93, no. 89.05, pg 1-10.

- Gray, C.A. and A.P. Schwab. 1993. Phosphorus-fixing ability of high pH, high calcium, coal-combustion waste materials. *Wat. Air Soil Poll.* 69:309-320.
- Jones, R.D. and A.P. Schwab. 1993. Nitrate leaching and nitrite occurrence in a heavy textured soil. *Soil Sci.* 155:272-282.
- Lal, R.B., D.E. Kissel, M.L. Cabrera, and A.P. Schwab. 1993. Kinetics of urea hydrolysis in wheat residue. *Soil Biol. Biochem.* 25:1033-1036.
- Pierzynski, G.M., and A.P. Schwab. 1993. Bioavailability of zinc, cadmium, and lead in a metal contaminated alluvial soil. *J. Environ. Qual.* 22:247-254.
- Schwab, A.P. 1993. Extractable and plant available metals in amended coal ash. *In Trace Metals in Coal and Coal Combustion Residues.* Chapter 9. pp 185-211. Lewis Publishers.
- Schwab, A.P. and M.K. Banks. 1993. The impacts of vegetation on the leaching of heavy metals from mine tailings: solubilization of zinc by organic acids. *Air Waste Manag.* vol. 93, no. 89.06, pp 1-9.
- Hetrick, J.A., and A.P. Schwab. 1992. Changes in aluminum and phosphorus chemistry in response to long-term fertilization. *Soil Sci. Soc. Am. J.* 56:755-761.
- Jayachandran, K., A.P. Schwab, and B.A. Hetrick. 1992. Partitioning dissolved inorganic phosphorus using acidified molybdate and isobutanol. *Soil Sci. Soc. Am. J.* 56:762-765.
- Jayachandran, K., A.P. Schwab, and B.A.D. Hetrick. 1992. Mineralization of organic phosphorus by vesicular-arbuscular mycorrhizal fungi. *Soil Biol. Bioch.* 24:897-903.
- Schwab, A.P., P. Splichal, and L. Sonon. 1993. Factors affecting the soil extraction and preconcentration by C18 solid-phase enrichment of alachlor, atrazine, and atrazine dealkylation products. *Application of Agricultural Analysis in Environmental Studies, ASTM STP 1162*, pp.86-91.
- Schwab, A.P., M.B. Tomecek, and P.D. Ohlenbusch. 1991. Plant availability of lead, cadmium, and boron in amended coal ash. *Water Air Soil Poll.* 57-58:297-306.
- Wilson, G.W.T., B.A.D. Hetrick, and A.P. Schwab. 1991. Reclamation effects on mycorrhizae and productive capacity of flue gas desulfurization sludge. 1990. *J. Environ. Qual.* 20:777-783.
- Girvin, D.C., L.L. Ames, A.P. Schwab, and J.E. McGarrah. 1991. Neptunium adsorption on synthetic amorphous iron oxyhydroxide. *J. Colloid Interf. Sci.* 141(1):67-78.
- Falatah, A., and A.P. Schwab. 1990. Plant-available iron and zinc in a calcareous soil as affected by additions of sulfur and micronutrient fertilizer. *J. Fert. Issues.* 7:35-40.
- Schaeffer, D. J., T.R. Seastedt, D.J. Gibson, D.C. Hartnett, B. Hetrick, S.W. James, D.W. Kaufman, A.P. Schwab, E.E. Herricks, E.W. Novak. 1990. *Environmental Management 1990*, 14(1):81-93.
- Thurman, E.M., M. Meyer, M. Pomes, C.A. Perry, and A.P. Schwab. 1990. Enzyme-linked immunosorbent assay compared with gas chromatography/mass spectrometry for the determination of triazine herbicides in water. *Anal. Chem.* 62:2043-2048.
- Jayachandran, K., A.P. Schwab, and B.A. Hetrick. 1989. VA-mycorrhizal mediation of phosphorus availability: Effect of synthetic iron chelate on phosphorus solubilization. *Soil Sci. Soc. Am. J.* 53:1701-1706
- Jones, R.D., and A.P. Schwab. 1989. A computer program for balancing chemical equations. *J. Agron. Educ.* 18:29-32.
- Schwab, A.P. 1989. Manganese-phosphate solubility relationships in an acid soil. *Soil Sci. Soc. Am. J.* 53:1654-1660.
- Schwab, A.P. and S. Kulyingyong. 1989. Changes in phosphate activities and availability indices with depth after 40 years of fertilization. *Soil Sci.* 147:179-186.
- Schwab, A.P. and W.L. Lindsay. 1989. Computer simulation of Fe(III) and Fe(II) complexation in limited nutrient solution. I. Program development and testing. *Soil Sci. Soc. Am. J.* 53:29-34.
- Schwab, A.P. and W.L. Lindsay. 1989. Computer simulation of Fe(III) and Fe(II) complexation in limited nutrient solution. II. Application to growing plants. *Soil Sci. Soc. Am. J.* 53:34-38.
- Schwab, A.P., C.E. Owensby, and S. Kulyingyong. 1989. Changes in soil chemical properties due to 40 years of fertilization. *Soil Sci.* 149:35-43.

- Schwab, A.P., M.D. Ransom, and C.E. Owensby. 1989. Exchange properties of an argiustoll: long-term effects of fertilization. *Soil Sci. Soc. Am. J.* 53:1412-1417.
- Hetrick, B.A.D., G.T. Wilson, D.G. Kitt, and A.P. Schwab. 1988. Effects of soil microorganisms on mycorrhizal contribution to growth of big bluestem grass in nonsterile soil. *Soil Biol. Biochem.* 20:501-507.
- Burnett, R.B., and A.P. Schwab. 1987. A computer program to aid in teaching diffuse layer theory. *J Agron. Ed.* 16:30-33.
- Schwab, A.P., and W.L. Lindsay. 1983. The effects of redox on the solubility and availability of iron. *Soil Sci. Soc. Am. J.* 47:201-205.
- Schwab, A.P., and W.L. Lindsay. 1983. The effects of redox on the solubility and availability of manganese in soils. *Soil Sci. Soc. Am. J.* 47:217-220.
- Schwab, A.P., W.L. Lindsay, and P.D. Smith. 1983. Elemental contents of plants growing on retorted oil shale. *J. Environ. Qual.* 12:301-304.
- Lindsay, W.L. and A.P. Schwab. 1982. The chemistry of iron in soils and its availability to plants. *J. Plant Nutr.* 5:821-840.
- Workman, S.M., P.N. Soltanpour, and A.P. Schwab. 1979. Use of inductively coupled plasma spectrometry for simultaneous determination of macro- and micronutrients in  $\text{NH}_4\text{HCO}_3$ -DTPA extracts of soils. *Soil Sci. Soc. Am. J.* 43:75-80.
- Klusman, R.W., S. Cowling, B. Culvey, C. Roberts, A.P. Schwab. 1977. Preliminary evaluation of secondary controls on mercury in soils of geothermal districts. *Geothermics* 6:1-8.
- Soltanpour, P.N, A. Khan, and A.P. Schwab. Effect of grinding variable on the  $\text{NH}_4\text{HCO}_3$ -DTPA soil test values for Fe, Zn, Mn, Cu, P, and K. *Commun. Soil Sci. Plant Anal.* 10:903-909.
- Soltanpour, P.N., and A.P. Schwab. 1977. A new soil test for the extraction of micro and macronutrients in alkaline soils. *Commun. Soil Sci. Plant Anal.* 8:195-207.

### **Peer-Reviewed Extension Publications (2)**

- de Koff, J.P., B.D. Lee and A.P. Schwab. 2007. Avoiding arsenic exposure from treated lumber around the home. Purdue University Cooperative Extension HENV-100-W. (<http://www.ces.purdue.edu/new/HENV-100-W.pdf>)
- de Koff, J.P., B.D. Lee and A.P. Schwab. 2007. Protecting your family from lead in the home. Purdue University Cooperative Extension HENV-101-W. ( <http://www.ces.purdue.edu/new/HENV-101-W.pdf> )

### **Books (1)**

- Banks, M.K., R.S. Govindaraju, A.P. Schwab, P. Kulakow, and J. Finn. 1999. *Phytoremediation of Hydrocarbon Contaminated Soils*. Lewis Publishers, Boca Raton, FL. 175 pp.

### **Published Proceedings and Reports (25)**

- Rathnayake, S. and A.P. Schwab. 2016. Chemical and mineralogical characterization of arsenic, lead, cadmium, and zinc in a smelter contaminated soil. *In* Bhattacharya et al. (eds), *Arsenic Research and Global Sustainability*. pp 181-182. Proceedings of the 6<sup>th</sup> International Congress on Arsenic in the Environment, Stockholm, Sweden, June 19-23, 2016
- Schwab, A. P. and M. K. Banks, Lead Stabilization in Transportation Impacted Soils, Final Report, JTRP, Indiana Department of Transportation, 2004.
- Banks, M. K. and A. P. Schwab, The Use of Phytoremediation for Department of Transportation Sites, Final Report JTRP, Indiana Department of Transportation, 2004.
- Banks, M.K., A.P. Schwab, Katy Euliss, Jill Shalabi, and Chi-hua Ho. 2004. Indiana Harbor Project: Field and Greenhouse Assessment of Phytoremediation. Submitted to US EPA Region V.

- Banks, M.K., A.P. Schwab, and R.S. Govindaraju. 1998. Phytoremediation of soil contaminated with petroleum hydrocarbons. Advanced Applied Technologies Demonstration Facility. 312 pp.
- Banks, M. K., Pekarek, S., Rathbone, K., and A. P. Schwab. 1997. "Phytoremediation of Petroleum Contaminated Soil: Microbial Assessment," Proceedings of the Battelle Fourth International Symposium on In-Situ and On-Site Bioremediation, New Orleans, LA. 4(3):305-308.
- Schwab, A.P., M.K. Banks, L.E. Erickson, and D. Graham. 1997. Enhancement of Bioremediation in Kansas: Final Report. Report to EPA EPSCoR. 93 pp.
- Nedunuri, K.V., R.S. Govindaraju, A.P. Schwab, and L.E. Erickson. 1996. Geochemical modeling of lead in vadose zone. ASCE North American Water and Environment Congress, Anaheim, CA, June 22-28, 1996.
- Banks, M.K., S.C. Wetzel, and A.P. Schwab. 1996. Phytoremediation of petroleum contaminated soils. Proc. Amer. Chem. Soc. Annual Meetings, New Orleans, LA. March 24-29, 1996.
- Schwab, A.P. 1995. Selected grass roots can remediate hydrocarbon contaminants. Soils Magazine. May, 1995. p 22.
- Schwab, A.P., G. Schnoor and L. Licht. 1993. The role of vegetation in stabilizing mining waste. Centerpoint.
- Waters, C.Y., M.K. Banks, and A.P. Schwab. 1993. Zinc movement in mine tailings amended with organics. Proc. Environ. Engg. Div., Amer. Soc. Civil Engg. Water Forum, Montreal, Canada.
- Banks, M.K., B.A. Hetrick, A.P. Schwab, K.G. Shetty, and G. Fleming. 1992. Characterization of a heavy metal contaminated site. Proc. Environ. Engg. Div., Amer. Soc. Civil Engg. Water Forum, Baltimore, MD, pp. 463-467.
- Pierzynski, G.P. and A.P. Schwab. 1992. Reducing heavy metal availability to soybeans grown on a metal contaminated soil. Proc. Conf. Haz. Waste Resear. pp. 543-553.
- Schwab, A.P., G.J. Kluitenberg, and L. S. Sonon. 1992. Leaching of atrazine, alachlor, and nitrate through soil and into groundwater. Kansas Water Resources Research Institute Report No. G2020-03.
- Schwab, A.P. 1992. Chemical and physical characterization of soils. Conf. Proc. Hazardous Substance Res. Center. pp. 326-344. KAES No. 93-31-A.
- Pierzynski, G.M., and A.P. Schwab. 1991. Characterization of lead and zinc mine tailings and heavy-metal contaminated soils in southeast Kansas. Proc. Conf. Haz. Waste Resear., USEPA Regions 7 and 8, Manhattan, KS.
- Schwab, A.P., and L. Sonon. 1991. Leaching of atrazine and nitrate through soil and into ground water. Kansas Water Resources Research Institute Completion Report. Report No. G1563-03.
- Splichal, P.A., and A.P. Schwab. 1991. Atrazine and alachlor degradation in shallow Kansas aquifers. Proceedings from Nonpoint Source Pollution: The Unfinished Agenda. March 20-21, 1991, Tacoma, WA.
- Schwab, A.P. and P.D. Ohlenbusch. 1990. Geochemical modeling of coal-ash leachates. Ground Water Management 1:311-324. National Water Well Association, Dublin, Ohio. KAES 90-202-A.
- Schwab, A.P., L. Sonon, and R.D. Jones. 1990. Leaching of atrazine and nitrate through soil and into ground water. Kansas Water Resources Research Institute Completion Report. Report No. G1563-03.
- Bascom, N., and A.P. Schwab. 1989. Migration of contaminants through coal-ash wastes. Hazardous Waste Symposium, Kansas State University. KAES 89-484-A.
- Sonon, L., Jones, R.D., and A.P. Schwab. 1989. Movement of Nitrate and Atrazine in Kansas Soils. Hazardous Waste Symposium, Kansas State University. KAES 90-86-A.
- Schwab, A.P. 1988. Leaching of atrazine and nitrate through soil and into groundwater. Kansas Water Resources Research Institute Completion Report #270. KWRRI, Kansas State University, Manhattan.
- Schwab, A.P. and R.D. Jones. 1986. Movement of fertilizer nitrate through soil into groundwater. Kansas Water Resources Research Institute Completion Report #260. KWRRI, Kansas State University, Manhattan, KS.

Schwab, A.P. 1983. Review of thermodynamic data for neptunium. Battelle Pacific Northwest Labs. Internal Report.

### **Invited Scientific Presentations (55)**

- Pandey, A., A.P. Schwab, and D. Little. 2020. Magnesium phosphate cement for rapid soil stabilization. First International Virtual Colloquium on Engineering, Sciences, and Technology and the Link with the Sustainable Development Goals. November 25, 2020. (virtual)
- Schwab, AP. 2015. Bio solids: Production, Regulations, Toxicity Protocols. Jiangsu Academy of Agricultural Sciences. Nanjing. August 20, 2015.
- Schwab, AP. 2015. Phytoremediation of Contaminated Soils. Institute of Soil Sciences, Chinese Academy of Sciences, Nanjing. August 20, 2015.
- Schwab, AP. 2015. Bio solids: Production, Regulations, Toxicity Protocols. Beijing Gaoneng Environmental Technology Company, LTD Beijing. August 18, 2015.
- Schwab, AP. 2015. Phytoremediation of Contaminated Soils. Beijing Gaoneng Environmental Technology Company, LTD Beijing. August 18, 2015.
- Schwab, AP. 2015. Bio solids: Production, Regulations, Toxicity Protocols. Regional Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing. August 17, 2015.
- Schwab, AP. 2015. Phytoremediation of Contaminated Soils. Regional Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing. August 17, 2015.
- Schwab, AP. 2015. Bio solids: Production, Regulations, Toxicity Protocols. Nanjing Agricultural University, Nanjing China. August 14, 2015.
- Whitehead, F.M., A.P. Schwab, and D. Graham. 2011. Integrating technology and aesthetics into the remediation of soils at abandoned gasoline stations. Sustainable Remediation International Conference. June 1-3, 2011, Amherst, Massachusetts.
- Nedunuri, K.V., A.P. Schwab, and R.S. Govindaraju. 2010. Modeling the transport of lead within contaminated soils amended with phosphate. Third annual perspective on the current and future state of water and the environment. Chennai, India. Jan. 5-7, 2010.
- Schwab, A.P. Bioremediation of contaminated soil and water. Soil and Water Conservation Society, West Lafayette Chapter. March, 2009.
- Schwab, A.P. The prospects for employing phytoremediation in highly impacted urban areas. Wolf Lake Community Action Coalition. Hammond, Indiana. April 2008.
- Schwab, A.P., M.K. Banks, and C. Henderson. 2007. Soil amendments for in situ immobilization of chromium. American Chemical Society Annual Meetings, Chicago, IL, March 28, 2007.
- Schwab, A.P., M.K. Banks, N. Cofield, and Z. Parrish. 2007. Mobility, Chemical Lability, and Bioavailability of PAHs in Contaminated Soils Amended with Biosolids. CSREES National Water Quality Symposium. Jan. 29. 2007, Savannah, Georgia.
- Schwab, A.P., N. Cofield, and M.K. Banks. 2005. Accumulation of PAHs in Plant Tissue During Phytoremediation of Contaminated Soils. Society of Environmental Toxicology and Chemistry (SETAC) Annual Conference. November 16, 2005. Baltimore, Maryland.
- Schwab, A.P. 2005. Advancements in the remediation of soils contaminated with petroleum and polyaromatic hydrocarbons. Third International Phytotechnologies Conference. April 19-22, 2005. Atlanta, GA.
- Cofield, N., A.P. Schwab, and M.K. Banks. 2004. Integration of Toxicity Tests into Remediation Studies. Soil Sci. Soc. Amer. Annual Meetings, Seattle, Wash. Nov. 1-3, 2004.
- Schwab, A.P., J. Alleman, M.K. Banks, and M. Switzenbaum. 2003. Development of an integrated biotoxicity protocol for biosolids. 2003. Water and Environment Federation Conference..February 19-22, 2003. Baltimore, MD.

- Schwab, A.P., J. Alleman, M.K. Banks, and M. Switzenbaum. 2003. Development of an integrated biotoxicity protocol for biosolids. 2003. Indiana Dept. of Environ. Mgmt. Biosolids Workshop. Indianapolis, IN.
- Schwab, A.P., K. Banks, and L. Newman. 2002. Dewater and remediation of dredged sediments using phytoremediation. Soil Sci. Soc. Am. Annual Meetings. Nov., 2002. Indianapolis.
- Schwab, A.P. 2002. Soil Chemistry Curriculum: The Purdue Perspective. American Society of Agronomy Annual Meetings, Nov. 11-14, 2002. Indianapolis, Indiana.
- Schwab, A.P. 2002. Phytoremediation of petroleum-contaminated soil: field trials. The Freshwater Spills Symposium. March 19-21, 2002. Cleveland, Ohio.
- Schwab, A.P. 2000. Phytoremediation of petroleum contaminated soils, and potential application to landfills. Indiana Dept. of Environmental Management. December 16, 2000.
- Schwab, A.P. 2000. Chemical speciation in the soil environment. Presented as part of Advancing Soil Quality into the 21st Century. Soil Science Society of America, Nov. 8, 2000, Minneapolis.
- Schwab, A.P. 1999. Phytoremediation of soils contaminated with xenobiotic, organic compounds. Dept. of Horticulture and Landscape Architecture. April, 1999.
- Banks, M.K., A.P. Schwab, and J.S. Smith. 1998. Bioavailability of petroleum contaminants in soils as affected by aging and phytoremediation. U.S. EPA OED Research Conference. Wash. D.C. Sept. 21-23, 1998.
- Banks, M.K., A.P Schwab, and R.S. Govindaraju. 1998. Phytoremediation of Diesel-Contaminated Soil at Craney Island Fuel Facility, Virginia. Southern States Conference, Biloxi, MS. Sept. 22, 1998
- Schwab, A. P., and M. K. Banks. 1998. Chromium Chemistry and Management of Chromium in Soils. Beneficial Effects of Vegetation in Contaminated Soils Workshop. Manhattan, KS.
- Banks, M. K., and A. P. Schwab. 1998. Phytoremediation of Soil Contaminated with PAHs and Other Petroleum Compounds. Beneficial Effects of Vegetation in Contaminated Soils Workshop, Manhattan, KS.
- Schwab, A.P. 1998. The mobility of heavy metals as impacted by plants and organic acids. Civil Engineering, Purdue University, March 20, 1998.
- Schwab, A.P. and M.K. Banks. 1997. Phytoremediation: Field Design and Site Management. Federal Remediation Technologies Roundtable, Nov. 19, 1997. Arlington, VA.
- Schwab, A.P., and M.K. Banks. 1997. Field studies of phytoremediation. "Phytoremediation," International Business Conferences, June, 1997, Seattle, Washington.
- Schwab, A.P. 1996. Interactions of flora and oil in soil. Oil in Soil Workshop. Amer. Soc. Agron. Annual Meetings. Nov. 3, 1996, Indianapolis, IN.
- Banks, M.K., and A.P. Schwab. 1996. Phytoremediation of soils contaminated with hazardous chemicals. Engineering and Environmental Science Institute Symposium on Energy and the Environment. Rice University, Houston, TX, Sept. 30- Oct. 1, 1996.
- Schwab, A.P., M.K. Banks, and K. Rathbone. 1996. Phytoremediation of petroleum contaminated soils. *In* Symposium on Phytoremediation of Contaminated Soils, Amer. Chem. Soc. Annual Meetings, Aug. 28-30, 1996, Orlando, FL.
- Rice, C.W., W.K. Dodds. A. P. Schwab, and M.K. Banks. 1995. Nitrates and biological activity in soil and ground water. National Science Foundation Sponsored Research Exhibition, Library of Congress, Washington, D.C.
- Banks, M.K., A.P. Schwab, and R.S. Govindaraju. 1995. Phytoremediation of petroleum contaminated soil -- laboratory, greenhouse and field studies. 1995 Five Centers' Research Conference. Gleneden, Oregon. July 24, 1995.
- Banks, M.K., A.P. Schwab, E.W. Brennan. 1995. Phytoremediation of petroleum contaminated soils: laboratory, greenhouse, and field studies. US EPA Symposium on Bioremediation of Hazardous Wastes, New York.

- Schwab, A.P., M.K. Banks, and X. Wang. 1995. Impact of vegetation on metals transport in soils. Emerging technologies in Hazardous Waste Management. Amer. Chem. Soc., Atlanta, Sept. 19, 1995.
- Schwab, A.P. 1995. Bioremediation of soils contaminated with toxic organics. Department of Geology, Kansas State University
- Banks, M.K., and A.P. Schwab. 1994. Phytoremediation of petroleum contaminated soil. Emerging Technologies in Hazardous Waste Management VI. Amer. Chem. Soc. Sept. 19-21, 1994. Atlanta, GA.
- Banks, M.K. and A.P. Schwab. 1994. Phytoremediation of soil contaminated with hazardous organic compounds. Gordon Conference: Bioremediation. New Hampshire.
- Banks, M.K. and A.P. Schwab. 1994. Remediation of hazardous contaminated soil using vegetation. Second International Symposium on Environmental Contamination in Central and Eastern Europe. Sept. 20-24, 1994. Budapest, Hungary.
- Banks, M.K. and A.P. Schwab. 1993. The benefits of vegetation in the bioremediation of hydrocarbons. Air and Waste Management Association. Denver, CO.
- Banks, M.K., and A.P. Schwab. 1993. Dissipation of polycyclic aromatic hydrocarbons in the rhizosphere. EPA Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Dallas, TX.
- Schwab, A.P. and M.K. Banks. 1993. Microbial degradation of organic chemicals in the rhizosphere: Implications for bioremediation. American Chemical Society National Meeting. Chicago, IL.
- Schwab, A.P. and M.K. Banks. 1993. The impacts of vegetation on the leaching of heavy metals from mine tailings: solubilization of zinc by organic acids. Air and Waste Management Association. Denver, CO
- Schwab, A.P. 1992. Nutrient uptake and soil-plant interactions. EPA Hazardous Substance Research Center Workshop, "Beneficial Effects of Vegetation in Contaminated Soils," Kansas State University.
- Schwab, A.P. 1992. Chemical and physical characterization of soil in environmental research. Hazardous Waste Research Conference, Boulder, Colorado.
- Schwab, A.P. 1992. Mined land revegetation as influenced by heavy metals. Hazardous Waste Research Conference, Boulder, Colorado.
- Schwab, A.P. 1992. Chemistry, physics, and microbiology of environmental solids. Amer. Instit. Chem. Engg. Summer National Meeting, Minneapolis, MN
- Schwab, A.P. 1990. Application of MINTEQ to leachates from coal ash. American Society of Agronomy Annual Meetings, San Antonio.
- Schwab, A.P. 1989. Movement of Nitrate and Atrazine Through Soil and into Groundwater. Water and the Future of Kansas. Kansas State University.
- Schwab, A.P. 1985. The effects of long-term fertilization on the chemical properties of a soil. University of Nebraska, Lincoln, NB.
- Schwab, A.P. 1985. The effects of redox on the chemistry of Mn and Fe in soils. Dept. of Geol., Kansas State University.

### **Presentations and Abstracts (206)**

- Pandey, A., A.P. Schwab, D.N. Little, D.W. Ming. 2021. In situ utilization: Synthesis of magnesium cement stabilized regolith for terrestrial and extraterrestrial construction. Soil Science Society of America Annual Meeting 2021, Soil Mineralogy Division. (Poster)
- Schwab, A.P., G.M. Gettiarachchi, A. Pandey, D.W. Ming. 2021. Sychrotron spectromicroscopic analyses of amorphous phases in Hawaiian palagonitic tephra. Soil Science Society of America Annual Meeting 2021, Soil Chemistry Division. (Oral Presentation)

- Pandey, A., A.P. Schwab, Y. Deng, D.W. Ming, E.B. Rampe. 2021. Chemical extraction methods and x-ray spectroscopic techniques for quantification of amorphous Si, Al, and Fe in phyllosilicate-poor palagonitic samples. Soil Science Society of America Annual Meeting 2021. Soil Mineralogy Division (Oral presentation).
- Babirye, N., A.P. Schwab, J. Howe, G. Ganjegunte, and B.E. Herbert. 2020. The effects of oilfield brine on soil properties and plant growth. Soil Science Society of America Annual Meeting 2020, Soils and Environmental Quality Division (Oral presentation). Virtual
- Pandey, A., A.P. Schwab, D.W. Ming, J. Bullard, J. 2020. A Robust Technique for Quantification of Si and Al Abundances within the Amorphous Phase of Phyllosilicate-poor Palagonitic Samples. Soil Science Society of America Annual Meeting 2020, Soil Mineralogy Division (Oral presentation). Virtual
- Pandey, A., P. Schwab, D. Little, J. Bullard, D.W. Ming. 2020. Biomimicry of naturally occurring minerals to develop composites with the chemical, mineralogical, and engineering properties ideal for construction with soil. Soil Science Society of America Annual Meeting 2020, Astropedology Division (Oral presentation). Virtual
- Pandey, A., A.P. Schwab, D.W. Ming, E. Rampe. 2020. Comparison of chemical extraction methods with X-ray spectroscopic techniques to tabulate concentrations of Si and Al in the amorphous phase of phyllosilicate-poor palagonitic samples. Soil Science Society of America Annual Meeting 2020, Astropedology Division (Oral presentation). Virtual
- Pandey, A., P. Schwab, and D.W. Ming. 2020. Analysis of X-ray amorphous phase abundance and composition in basaltic samples as potential amendments for Martian soil analogues. Clay Minerals Society Annual Meetings. Virtual.
- Schwab, A.P. 2020. Plant assimilation of polyaromatic hydrocarbons from contaminated soil. Soil Science Society of America Annual Meeting 2020, Soil Chemistry Division (Oral presentation). Virtual
- Alvarado, T., P Schwab, A.P. Lee, B. Tomlin. 2019 Selection of internal standards for ICP-MS analysis of as in soils. ASA, CSSA and SSSA International Annual Meetings, San Antonio.
- Lee, A. and A.P. Schwab. 2019. Phytoremediation of arsenic and the immobilization of lead in soil: The impacts of apatite particle size. ASA, CSSA and SSSA International Annual Meetings, San Antonio.
- Pandey, A., A.P. Schwab, D.W. Ming, B. Sutter, J. Gruener, D. Little. 2019. Characterizing binder-stabilized composites synthesized from a Martian soil simulant for extraterrestrial construction. ASA, CSSA and SSSA International Annual Meetings, San Antonio.
- Pandey, A., A.P. Schwab, D.W. Ming, B. Sutter, J. Gruener, D. Little. Chemical, mineralogical, and engineering properties of composites of Martian and lunar simulants as extraterrestrial construction materials. ASA, CSSA and SSSA International Annual Meetings, San Antonio.
- Yi, Y., A.P. Schwab, K. Sung. 2019. Effects of soil amendments on the quality of soil remediated by thermal desorption. ASA, CSSA and SSSA International Annual Meetings, San Antonio.
- Schwab, A.P., A. Pandey, B. Birgisson, S. Banerjee, D. Ming. 2019. Rapid 3D printing for construction of extraterrestrial buildings with indigenous materials. 2018-2019 International Soils Meeting. San Diego, California.
- Pandey, A., A.P., B. Birgisson, S. Banerjee, D. Ming. 2019. Extraterrestrial construction with 3D printing: material selection and testing. 2018-2019 International Soils Meeting. San Diego, California.
- Limon, V., J.A. Aitkenhead-Peterson, M. Smith, C. Speights, B. Barton, M. Lashley, J. Tomberlin, J. Mowrer, and A. P. Schwab. 2018. Effect of mass mortality events on water extractable soil nutrients. Environmental Society of America. New Orleans.
- Ding, Y. P. Schwab, M. A. Armienta, and Deng, Y. Phase transformation and crystallinity change of iron oxide nanoparticles and their retention of As, Cu, and Zn in simulated acid mine drainage neutralization by calcite and dolomite. 55th Annual Meeting of The Clay Minerals Society. University of Illinois at Urbana-Champaign. Illinois, USA. June 11-14, 2018.

- Paul, J. C., P. Schwab, P. Knappett, and Y. Deng. Hydrogeochemical processes causing persistent low pH in lakes within a reclaimed lignite mine, East Texas. American Geophysical Union (AGU) Fall Meeting, 2017. New Orleans, Louisiana, USA. December 11-15, 2017.
- Mao, Y., Sun, MM, Li, X, Schwab, AP, Jiang, X. 2016. Novel promising biocomposite derived from calcined eggshells for mitigating soil antibiotic resistance bacteria/gene dissemination and accumulation in bell pepper. Abstracts of Papers of the American Chemical Society. 252:201.
- Sun, MM, Mao, Y, Schwab, AP, Kuan, L, Da, T. 2016. Arm wrestling between soil denitrifying genes and antibiotic resistant genes under enforced anaerobic denitrification condition. Abstracts of Papers of the American Chemical Society. 252:204.
- Rathnayake, S. A.P. Schwab. 2015. Chemical and Mineralogical Characterization of Arsenic, Lead, Cadmium and Zinc in a Smelter Contaminated Soil. Soil Sci. Soc Amer. Annual Meetings, Minneapolis, MN. Nov 15-18, 2015.
- Igwe, Alexandria, A.P. Schwab, and F. Whitehead. 2014. Screening of horticultural plants for phytoremediation of aged motor oil in soil. Ecological Society of America. Sacramento, CA. Aug 10-15, 2014.
- Frey, G., M. Qu, M.K. Banks, A.P. Schwab, and K.A. Cherkauer. 2011. Thermal properties of green roof media during plant establishment and growth. ASME 2011 5th International Conference on Energy Sustainability. August, 2011. Washington DC.
- Snyder, L.U., A.P. Schwab, and M. Diekman. 2010. The freshman's perspective of transformational learning experiences. American Society of Agronomy. October 2011, San Antonio.
- Krishnakumar, N. A.P. Schwab, and R.S. Govindaraju. 2010. Modeling the transport of lead within contaminated soils amended with phosphates. ASCE/EWRI. 2010. India.
- Snyder, L.U., A.P. Schwab, and M. Diekman. 2010. The freshman's perspective of transformational learning experiences. American Association of Agricultural Educators.
- Sun, B.Z., C. Johnston, A.P. Schwab, E. Blatchley. 2009. Chemical equilibrium modeling of fouling matrix in UV disinfection. Disinfection90, Atlanta, GA.
- Schwab, A.P. 2008. Parameters to be considered in the phytoremediation of soils with organic contaminants. CRDF Research Development Workshop. Nov. 6, 2008. Almaty, Kazakhstan.
- Schwab, A.P., M.K. Banks, and C. Henderson. 2007. Soil amendments for in situ immobilization of chromium. American Chemical Society Annual Meetings, Chicago, IL, March 28, 2007.
- Schwab, A.P., M.K. Banks, N. Cofield, and Z. Parrish. 2007. Mobility, chemical lability, and bioavailability of pahs in contaminated soils amended with biosolids. CSREES National Water Quality Symposium. Jan. 29. 2007, Savannah, Georgia.
- Schwab, A.P., X. Gao, MK Banks, D Schulze, C. Johnston. Soil amendments to reduce bioavailability of metals in soils: experimental studies and spectroscopic verification. SERDP-ESTCP Technology Conference. Washington DC. November, 2006.
- Kang, D.H., M.K. Banks, and A.P. Schwab, Sorption of iron cyanide compounds onto clay minerals and manganese oxides, Division of Environmental Chemistry, 230th ACS National Meeting, Washington, DC, 2005
- Schwab, A.P., M.K. Banks, C. Johnston, D. Schulze, A. Szlezak. 2005. Soil amendments to reduce bioavailability of metals in soils: experimental studies and spectroscopic verification. Partners in Environmental Technology Symposium. Washington, DC. November 29 – December 1, 2005.
- Szlezak, A., Schwab, A.P. 2005. Lanthanum(III) and cerium(III) in in-situ chemical stabilization of metals in soils with low redox potential. Society of Environmental Toxicology and Chemistry (SETAC) Annual Conference. November 15, 2005. Baltimore, Maryland.
- Hong, R.L., M.K. Banks, and A.P. Schwab. 2005. Phytoremediation of cyanide contaminated soil and groundwater at MGP sites. Third International Phytotechnologies Conference. April 19-22, 2005. Atlanta, GA.

- Blaylock, M.J., G.S. Banuelos, A.P. Schwab, and B.W. Ferguson. 2005. Utilizing Agricultural resources for cost effective application of phytotechnologies and developing farm income opportunities. Third International Phytotechnologies Conference. April 19-22, 2005. Atlanta, GA.
- Biery, P., L. Newman, and A.P. Schwab. 2005. Phytoremediation of dredged river sediments. Third International Phytotechnologies Conference. April 19-22, 2005. Atlanta, GA.
- Euliss, K, J. Shalabi, C.H. Ho, A.P. Schwab, and M.K. Banks, "Phytoremediation of PAHs at the Indiana Harbor," Poster presented at the EPA/ORD-HSRC Superfund Research on Risk Characterization and Monitoring Conference, Las Vegas, NV, 2004.
- Euliss, K.W., A.P. Schwab, and M.K. Banks. 2004. Using Plants to Dewater and Remediate Contaminated Dredged Sediments. Soil Sci. Soc. Amer. Annual Meetings, Seattle, Wash. Nov. 1-3, 2004.
- Humphreys, M.T., M.K. Banks, A.P. Schwab, C. Johnston, D. Schulz, and X. Gaodong. Immobilization of heavy metals in soil, Poster presented at the Partners in Environmental Technology Technical Symposium and Workshop, Annual SERDP Meeting, Washington, DC, 2004.
- Banks, M.K., A.P. Schwab, C. Johnston, D. Schulz, K.D. Lewis. 2003. Soil amendments to reduce bioavailability of metals in soils: experimental studies and spectroscopic verification. SERDP/ESTCP "Partners in Environmental Technology Symposium & Workshop." Dec. 2-4, Washington DC.
- Euliss, K.W, A.P. Schwab, Lee Newman, K.V. Nedunuri, and M.K. Banks, 2003. Dewatering and remediation of dredged sediments, August 16, 2003, Purdue University Wetlands Conference, West Lafayette, IN.
- Euliss, K.W, A.P. Schwab, Lee Newman, K.V. Nedunuri, and M.K. Banks, 2003. Dewatering and remediation of dredged sediments. Soil Sci. Soc. Amer. Annual Meetings, Nov. 3-6, Denver, Colorado.
- Hunter, J.G., J.C. Hickey, M.K. Banks, A.P. Schwab, and J. Alleman. 2003. Constructed wetlands for remediation of slag leachates. Purdue University Wetlands Conference, West Lafayette, IN.
- Lewis, K.D., A.P. Schwab, and M.K. Banks. 2003. Evaluation of chemical extraction indices for metals in biosolids. Soil Sci. Soc. Amer. Annual Meetings, Nov. 3-6, Denver, Colorado.
- Schwab, A.P., Lee Newman, K.V. Nedunuri, and M.K. Banks, Dewatering and remediation of dredged sediments, 2003. U.S. EPA Region 5 Research Workshop. June 17, 2003, Chicago, Illinois.
- Schwab, A.P., Lee Newman, K.V. Nedunuri, and M.K. Banks. 2003. Dewatering and remediation of dredged sediments, 2003 Midwest Hazardous Substance Research Meeting (Purdue University and US EPA), May 13, 2003, Embassy Suites Plaza Hotel, Kansas City, Missouri.
- Simmons, Bilal, K.W. Euliss, K.V. Nedunuri, A.P. Schwab, M.K. Banks and S.I. Sritharan. 2003. Experiences From A Field Study To Dewater Contaminated Sediments Using Plants. 18th Willie Washington Science Symposium, November 7, 2003, Central State University, Wilberforce, Ohio.
- Szlezak, A., and A.P. Schwab. 2003. Chemical characterization of leachates from coal piles. Soil Sci. Soc. Amer. Annual Meetings, Nov. 3-6, Denver, Colorado.
- Pu, X.Z., Y.J. Zhao, L.S. Lee, A.P. Schwab, G.P. Carlson. 2002. Bioavailability of Pentachlorophenol from Different Types of Soils, 41st Annual Meeting of the Society of Toxicology, March 18-22, 2002, The Toxicologist-Supplement of Toxicological Sciences. Vol. 66(1-S):138.
- Schwab, A.P., Banks, M.K., Krisnakumar, N., Euliss, K.W., and Mankad V.S. 2002. Dewatering, Remediation, and Evaluation of Dredged Sediments. Annual Midwest Hazardous Substance Research Center Meeting. May 17-18 2002.
- Schwab, A.P., M.K. Banks, N. Krisnakumar, K.W. Euliss, and V.S. Mankad. 2002. Dewatering, remediation, and evaluation of dredged sediments. ASI Phytoremediation of heavy metals advanced learning institute August 14, 2002.
- Schwab, A.P., M.K. Banks, and L. Newman. 2002. Dewatering and remediation of dredged sediments using phytoremediation. American Society of Agronomy Annual Meetings, Nov. 11-14, 2002. Indianapolis, Indiana.

- Shalabi, J., M.K. Banks, and A.P. Schwab. 2002. A Treatability Study for the Phytoremediation of Petroleum-Contaminated Sediments. The Freshwater Spills Symposium. March 19-21, 2002. Cleveland, Ohio.
- Pu, X., Y.J. Zhao, L.S. Lee, A.P. Schwab, and G.P. Carlson. 2002. Bioavailability of pentachlorophenol from different types of soils. Soc. Toxicol. Annual Meeting, March 17-21, 2002.
- Schwab, A.P., M.K. Banks, and J. Alleman. 2001. Development of an integrated biotoxicity protocol for biosolids. Sixth Annual Conf. Biogeochemistry of Trace Elements. Jul. 29-Aug 2, 2001. Guelph, Ontario.
- Banks, M.K., A.P. Schwab, S.L. Hutchinson, T. Spriggs, and R. Kim, 2001. Enhanced biodegradation of soil contaminants in the rhizosphere, Presented at the Railroad Environmental Conference, Champaign, IL, 2001.
- Banks, M.K., A.P. Schwab, R. Kim, B. Liu, and P. Kulakow. 2000. Impact of plants on the bioavailability of soil contaminants, Poster presented at the Five Centers EPA Hazardous Substance Research Centers Conference, Asilomar Conference Center, Pacific Grove, CA, 2000.
- Banks, M.K. and A.P. Schwab. 2000. Remediation of petroleum impacted soils using plants, Presented at the EPA Phytoremediation: State of the Science Conference, Boston, MA, 2000.
- Magturo, N.E., A.P. Schwab, and B.C. Joern. 2000. Heavy metal distribution in soil twenty years after biosolid application. Agronomy Abstracts, 2000, pg 409. Soil Science Society of America Annual Meeting, Nov. 8, 2000, Minneapolis.
- Nedunari, K., R.G. Govindaraju, A.P. Schwab. 2000. Enhanced mobility of lead in soil rhizosphere: model development and experimental verification. Amer. Soc. Civil Engineers, Minneapolis.
- Schwab, A.P. 2000. Chemical speciation in the soil environment. Agronomy Abstracts, 2000, pg 409. Soil Science Society of America Annual Meeting, Nov. 8, 2000, Minneapolis.
- Zhao, Y.M., A. P.Schwab, L.S. Lee, M.K. Banks, X. Pu, and G. Carlson. 2000. Chemical lability and bioavailability of PCP on soil. Agronomy Abstracts, 2000, pg 410. Soil Science Society of America Annual Meeting, Nov. 8, 2000, Minneapolis.
- Banks, M.K., A.P. Schwab, J.S. Smith, P. Kulakow, and B. Liu. 1999. Effect of plants on bioavailability and toxicity of soil contaminants. The Fifth International Symposium on In Situ and On-Site Bioremediation, April 19-22, San Diego.
- Edwards, I.P., and A.P. Schwab. 1999. Aggregate-level study of microbial community structure. Agron. Abstracts. p. 228.
- Kulakow, P.A., R. Karthikeyan, B. Leven, H. Li, G. Pierzynski, and A.P. Schwab. 1999. Phytoremediation of vehicle wash sediments. 14th Annual Conference on Hazardous Waste Research. May 19-22, 1998, St. Louis.
- Kulakow, P.A., R. Karthikeyan, B. Leven, H. Li, G. Pierzynski, and A.P. Schwab. 1999. Phytoremediation of vehicle wash sediments. Agron. Abstracts. p. 35.
- Schwab, A.P., M.K. Banks, and S. Lewis. 1999. Phytoremediation of Petroleum-Contaminated Soils: Greenhouse and Field Studies. International Business Conferences, Toronto, Canada, June, 1999.
- Schwab, A.P., M.K. Banks, and J.S. Smith. 1999. Field assessment at Port Hueneme Naval Facility. West Coast Contaminated Soils Conference, Oxnard California. March, 1999.
- Banks, M.K., A.P. Schwab, J.S. Smith, P. Kulakow, and K. Miller. 1998. Evaluation of bioavailability in the field for petroleum contaminated soil, 14th Annual Conference on Contaminated Soils, Amherst, MA, 1998.
- Kulakow, P., A.P. Schwab, M.K. Banks, S. Lewis, K. Rathbone, and J. Keller. 1998. Phytoremediation of petroleum contaminated soils: laboratory and greenhouse studies. 90th Annual Meeting of the American Society of Agronomy, Baltimore, MD.
- Schwab, A.P., M.K. Banks, P. Kulakow, K. Rathbone, and S. Lewis. 1998. Phytoremediation of contaminated soils: Field studies. 90th Annual Meeting of the American Society of Agronomy, Baltimore, MD.

- Banks, M.K. and A.P. Schwab. 1998. A case study in how to evaluate phytoremediation's performance on the Navy's Craney Island Fuel Terminal. IBC Phytoremediation Conference, Houston, TX.
- Banks, M.K., A.P. Schwab, and J.S. Smith. 1998. Bioavailability of petroleum contaminants in vegetated soil. Annual West Coast Conference on Contaminated Soils and Groundwater, Oxnard, CA.
- Banks, M.K., and A.P. Schwab. 1997. Field evaluation of phytoremediation of petroleum contaminated soil. On-site and in situ bioremediation, an international conference. New Orleans, April 29, 1997.
- Banks, M. K., and A.P. Schwab. 1997. Assessment of phytoremediation in field trials. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Burckhard, R.R., A.P. Schwab, and M.K. Banks. 1997. The effect of vegetation on the transport of heavy metal contaminated soil. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- He, Y., A.P. Schwab, M.K. Banks, and S. Burckhard. 1997. Adsorption and transport of Pb in soil as affected by organic ligands: batch and column study. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Keller, J., M.K. Banks, and A.P. Schwab. 1997. The effect of soil depth and root surface area on the degradation of polycyclic aromatic hydrocarbons. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Kulakow, P., A.P. Schwab, M.K. Banks, and A. Ryser. 1997. Variation among nine plant species for hydrocarbon degradation in crude oil contaminated soil. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Lewis, S.L., M.K. Banks, and A.P. Schwab. 1997. Phytoremediation field design and site management. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Liu, B., M.K. Banks, and A.P. Schwab. 1997. Investigation of the kinetics and metabolites of phenanthrene in soil at different moisture contents. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Pekarek, S.D., M.K. Banks, and A.P. Schwab. 1997. Phytoremediation of petroleum contaminated soils: a microbial community assessment. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Rathbone, K, M.K. Banks, and A.P. Schwab. 1997. Sorghum variety impact on the biodegradation of diesel fuel contaminated soil. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Schwab, A.P. 1997. Evaluation of lagoons for the containment of solid waste. Water and the Future of Kansas, March, 1997, Manhattan, KS.
- Su, J., A.P. Schwab, M.K. Banks, and P. Kulakow. 1997. Assessing the phytoremediation of aged petroleum hydrocarbons in contaminated soil by gas chromatography/mass spectrometry. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Zhu, D., A.P. Schwab, and M.K. Banks. 1997. The impact of vegetation on heavy metal movement. 12<sup>th</sup> Annual Conference on Hazardous Waste Research. May 19-22, 1997, Kansas City.
- Banks, M.K., A.P. Schwab., and R.S. Govindaraju. 1996. Phytoremediation of petroleum contaminated soil - a field assessment. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1996. The effect of vegetation on the transport of heavy metals in a contaminated soil: a column study. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1996. Rates of adsorption of Pb, Zn, and Cd on soil as affected by organic acids. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- Chen, Z., A.P. Schwab, and M.K. Banks. 1996. Detection of agronomic and bioremediation variabilities between alfalfa clones grown in crude-oil contaminated soil. Hazardous Substance Research

- Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Das, B.S., G.J. Kluitenberg, A.P. Schwab, and S.M. Welch. 1996. Equilibrium and kinetic sorption studies of atrazine in batch and leaching experiments. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- He, Y., A.P. Schwab, and M.K. Banks. 1996. Adsorption and transport of zinc as affected by complexing ligands. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- He, Y., A.P. Schwab, and M.K. Banks. The transport of zinc in soil as affected by citrate. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Henderson, C.T., M.K. Banks, and A.P. Schwab. 1996. The effects of the rhizosphere on the oxidation state of chromium in sludge-amended soils. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Kulakow, P.A., Z. Chen, K. Rathbone, A.P. Schwab, M.K. Banks, and P.J. Bramel-Cox. 1996. Sorghum varieties grown in soil contaminated with petroleum hydrocarbons. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Kyle, W., D. Skinner, W. Rooney, M.K. Banks, and A.P. Schwab. 1996. Selection of alfalfa populations for remediation of crude-oil contaminated soils. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- Lewis, S., M.K. Banks, and A.P. Schwab. 1996. Phytoremediation of soil contaminated with petroleum products: field demonstrations. Eleventh Annual Conference on Contaminated Soil. Oct. 21-24, 1996. Amherst, MA.
- Lewis, S.L., M.K. Banks, and A.P. Schwab. 1996. Effects of fertilization rates on phytoremediation of petroleum contaminated soils. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Liu, B., M.K. Banks, A.P. Schwab, and L. Schuckman. 1996. Influence of moisture content on bioremediation of organic contaminants in the subsoil. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Pekarek, S.D., J. Keller, M.K. Banks, and A.P. Schwab. 1996. An assessment of microbial changes during phytoremediation. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Rathbone, K., A.P. Schwab, and M.K. Banks. 1996. Effect of plant exudates on the bioremediation of synthetic diesel fuel. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Rathbone, K., Z. Chen, P. Kulakow, M.K. Banks, and A.P. Schwab. 1996. Impact of different sorghum varieties on biodegradation of diesel fuel in soil. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- Su, J., A.P. Schwab, and M.K. Banks. 1996. Development of an efficient extraction method for petroleum hydrocarbons in soil. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.
- Su, J. and A.P. Schwab. 1996. Determination of total petroleum hydrocarbons in contaminated soil. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Wang, E.X., M.K. Banks, and A.P. Schwab. 1996. Use of biomarkers to assess phytoremediation of petroleum-contaminated soils. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Wang, E.X., M.K. Banks, and A.P. Schwab. 1996. Assessing phytoremediation of petroleum hydrocarbons in soils using biomarkers and GC/MS. 88th Annual Meeting, ASA, CSSA, SSSA. Nov. 3-8, 1996. Indianapolis, IN.

- Zhu, D., A.P. Schwab, and M.K. Banks. 1996. The impact of vegetation on heavy metal movement in soil columns. Hazardous Substance Research Center/Western Environmental Research Center Joint Conference. May 21-23, 1996. Albuquerque, NM.
- Arunachalam, M., M.K. Banks, and A.P. Schwab. 1995. Biodegradation and dissipation of polycyclic aromatic hydrocarbons in soil rhizosphere. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Banks, M.K., A.P. Schwab, and R.S. Govindaraju. 1995. Phytoremediation of petroleum contaminated soil -- a technology transfer project. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1995. Characterization of lead containing mining and smelter waste. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Burckhard, S., A.P. Schwab, and M.K. Banks. 1995. Influence of plants on the movement of heavy metals in soil. 1995 Five Centers' Research Conference. Gleneden, Oregon. July 24, 1995.
- Freeborn, T.J., M.K. Banks, R.S. Govindaraju, C. Rice, and A.P. Schwab. 1995. Influence of a fluctuating water table on microbial degradation of pesticides. Conf. Hazardous Waste Remediation, Manhattan, KS.
- He, Y., A.P. Schwab, and M.K. Banks. 1995. Effect of citrate on the adsorption of zinc to soil.
- Lewis, S., M.K. Banks, and A.P. Schwab. 1995. Phytoremediation of organic contaminants in soil. 1995 Five Centers' Research Conference. Gleneden, Oregon. July 24, 1995.
- Lee, E., M.K. Banks, and A.P. Schwab. 1995. Fate of benzo[a]pyrene in the rhizosphere of *Festuca arundinacea*. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Prabhushankar, R.N., L.N. Reddi, and A.P. Schwab. 1995. Assessment of clay colloid-associated transport of herbicides into subsurface. Amer. Soc. Civil Engineers, Pittsburgh.
- Rooney, W.L., Z. Chen, A.P. Schwab, M.K. Banks, and C. Wiltse. 1995. The effect of nitrogen fixation and fertilization in alfalfa on phytoremediation of PAHs. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Schwab, A.P., and M.K. Banks. 1995. Degradation of petroleum contaminants in soil: greenhouse and field studies. On-site Bioremediation, An International Conference. San Diego, CA.
- Schwab, A.P., M.K. Banks, and R.S. Govindaraju. 1995. Phytoremediation of petroleum contaminated soils. Tenth Annual Conference on Contaminated Soil. Oct. 23-26, 1995. Amherst, MA.
- Wetzel, S.C., M.K. Banks, and A.P. Schwab. 1995. Behavior of polycyclic aromatic hydrocarbons (PAHs) in rhizosphere soil. Conf. Hazardous Waste Remediation, Manhattan, KS.
- Wiltse, C.C., W.L. Rooney, A.P. Schwab, and M.K. Banks. 1995. Detection of agronomic variability between alfalfa clones grown in crude-oil contaminated soils. Amer. Soc. Agron. Annual Meetings, St. Louis, MO.
- Abdel-saheb, I., and A.P. Schwab. 1994. Leaching of heavy metals in soil columns under saturated conditions. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Abdel-saheb, I., A.P. Schwab, and M.K. Banks. 1994. Mobilization of heavy metals in mine tailings as influenced by revegetation. Amer. Soc. Agron., Seattle, WA.
- Banks, M.K., A.P. Schwab, S. Burckhard, and I. Abdel-saheb. 1994. Effects of the rhizosphere on the movement of heavy metals in contaminated soils. Second International Symposium on Environmental Contamination in Central and Eastern Europe. Sept. 20-24, 1994. Budapest, Hungary.
- Banks, M.K., and A.P. Schwab. 1994. Phytoremediation of petroleum contaminated soil. Gordon Research Conference: Environmental Sciences -- Contaminants in Soil and Subsurface Systems; Fundamentals, Applications, and Risks. New Hampton, NH.
- Banks, M.K., A.P. Schwab, R.S. Govindaraju, and Z. Chen. 1994. Bioremediation of petroleum contaminated soil - A technology transfer project. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1994. The effect of organic acids on the leaching of heavy metals from mine tailings. Conf. Hazardous Waste Remediation, Bozeman, MT.

- Burckhard, S.R., A.P. Schwab, and M.K. Banks. 1994. Mobilization of metals from mine tailings by organic acids. Amer. Soc. Agron. Annual Meetings, Seattle.
- Chen, Z., M.K. Banks, and A.P. Schwab. 1994. Bioremediation of petroleum contaminated soil using vegetation -- a technology transfer project. Conf. Hazardous Waste Remediation, Bozeman, MT.
- He, Y., S. Burckhard, A.P. Schwab, and M.K. Banks. 1994. Adsorption of heavy metals on rhizosphere soil. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Hetrick, B.A.D., A.P. Schwab, Wilson, G.W.T. Wilson, and T. Chua. 1994. Examination of interplant transfer of phosphorus through mycorrhizal bridging. Amer. Soc. Agron. Annual Meetings, Seattle.
- Kim, S.C., M.K. Banks, and A.P. Schwab. 1994. Enhancement of polycyclic aromatic hydrocarbon biodegradation in the rhizosphere. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Lee, E., M.K. Banks, and A.P. Schwab. 1994. Fate of pyrene in the rhizosphere. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Malathi, A., M.K. Banks, and A.P. Schwab. 1994. Vegetative bioremediation of phenanthrene. Conf. Hazardous Waste Remediation, Bozeman, MT.
- Schwab, A.P., B.A.D. Hetrick, G.W.T. Wilson, and K. Jayachandran. Assessing the role of mycorrhizae in enhancing phosphorus uptake by the host plant. Amer. Soc. Agron. Annual Meetings, Seattle.
- Adbdel-saheb, I.Z., A.P. Schwab. 1993. Leaching of heavy in soil columns under unsaturated conditions. Amer. Soc. Agron. Annual Meetings, Cincinnati. Agron. Abs.
- Banks, A.P. and A.P. Schwab. 1993. The benefits of vegetation in the bioremediation of hydrocarbons. Air and Waste Management Association. Denver, CO.
- Banks, M.K., and A.P. Schwab. 1993. Dissipation of polycyclic aromatic hydrocarbons in the rhizosphere. EPA Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Dallas, TX.
- Chua, T., A.P. Schwab, and B.A.D. Hetrick. 1993. Contribution of mycorrhizal-mediated interplant transfer to phosphorus uptake in *Andropogon gerardii*. 9th North American Conference on Mycorrhizae, University of Guelph, Guelph, Ontario.
- Fisher, L.E., G.A.D. Hetrick, D.C. Hartnett, and A.P. Schwab. 1993. mycorrhizal-mediated interplant phosphorus transfer among tallgrass prairie species. 9th North American Conference on Mycorrhizae, University of Guelph, Guelph, Ontario.
- Kluitenberg, G.J., L.S. Sonon, and A.P. Schwab. 1993. Nonequilibrium adsorption and degradation of atrazine and alachlor in soil. Symposium on Agricultural Nonpoint Sources of Contaminants: A Focus on Herbicides. Lawrence, KS.
- Schwab, A.P. 1993. Influence of organic acids on the leaching of metals of Zn from mine tailings. Second International Conference on the Biogeochemistry of Trace Elements. Taipei, Republic of China.
- Schwab, A.P. and M.K. Banks. 1993. Microbial degradation of organic chemicals in the rhizosphere: Implications for bioremediation. American Chemical Society National Meeting. Chicago, IL.
- Schwab, A.P. and M.K. Banks. 1993. The impacts of vegetation on the leaching of heavy metals from mine tailings: solubilization of zinc by organic acids. Air and Waste Management Association. Denver, CO
- Schwab, A.P. and M.K. Banks. 1993. The impacts of vegetation on the leaching of heavy metals from mine tailings: solubilization of zinc by organic acids. Hazardous Waste Research Conf. Manhattan, KS.
- Schwab, A.P. and M.K. Banks. 1993. Dissipation of pyrene and anthracene in the rhizosphere. Amer. Soc. Agron. Annual Meetings, Cincinnati. Agron. Abs.
- Schwab, A., K. Banks, W. Dodds, J. Koelliker, G. Macpherson, C. Rice, and M. Sophocleous. 1993. Biotic and abiotic factors controlling nitrogen flux in pristine and agricultural subsurface environments. Kansas EPSCoR Conference, September 19-20, 1993. Topeka, KS.
- Shetty, K.G., B.A.D. Hetrick, and A.P. Schwab. 1993. Effects of mycorrhizae and fertilizer amendments on plant zinc tolerance. Ninth North American Conference on Mycorrhizae. Guelph, Ontario.

- Thien, S.J., C.W. Rice, and A.P. Schwab. 1993. Undergraduate research assistantships. Amer. Soc. Agron. Annual Meetings, Cincinnati. Agron. Abs.
- Waters, C.Y., M.K. Banks, and A.P. Schwab. 1993. Zinc movement in mine tailings amended with organics. Proc. Environ. Engg. Div., Amer. Soc. Civil Engg. Water Forum, Montreal, Canada.
- Wilson, G.W.T., B.A.D. Hetrick, and A.P. Schwab. 1993. Mycorrhizal activity in warm- and cool-season grasses: variation in nutrient uptake by external hyphae. 9th North American Conference on Mycorrhizae, University of Guelph, Guelph, Ontario.
- Abdel-saheb, I, A.P. Schwab, M.K. Banks, and B.A. Hetrick. 1992. Chemical characterization of heavy metals in contaminated soils of southeast Kansas. Hazardous Waste Research Conference, Boulder, Colorado.
- Abdel-saheb, I., A.P. Schwab, M.K. Banks, and B.A. Hetrick. 1992. Chemical characterization of a heavy-metal contaminated soil in southeast Kansas. Agronomy Abstracts p. 30.
- Banks, M.K., B.A. Hetrick, A.P. Schwab, K.G. Shetty, and G. Fleming. 1992. Characterization of a heavy metal contaminated site. Amer. Soc. Civ. Engineers, Annual Conf., Baltimore, MD.
- Chua, T.T., A.P. Schwab, and B.A. Hetrick. 1992. Quantification of mycorrhizal contribution to phosphorus transfer in a prairie grass. Agronomy Abstracts p. 251.
- Hetrick, B.A., M.K. Banks, A.P. Schwab, and D. Hoobler. 1992. Rhizosphere microbial-plant interactions in heavy metal contaminated soil. Hazardous Waste Research Conference, Boulder, Colorado.
- Pierzynski, G.M., and A.P. Schwab. 1992. Reducing heavy-metal availability to soybeans grown on a metal contaminated alluvial soil. Agronomy Abstracts p. 53.
- Pierzynski, G.M. and A.P. Schwab. 1992. Reducing heavy metal availability to soybeans grown on a heavy metal contaminated soil. Hazardous Waste Research Conference, Boulder, Colorado.
- Schwab, A.P. 1992. Chemical and physical characterization of soil in environmental research. Hazardous Waste Research Conference, Boulder, Colorado.
- Schwab, A.P. 1992. Mined land revegetation as influenced by heavy metals. Hazardous Waste Research Conference, Boulder, Colorado.
- Schwab, A.P. 1992. Chemistry, physics, and microbiology of environmental solids. Amer. Instit. Chem. Engg. Summer National Meeting, Minneapolis, MN
- Waters, C., A.P. Schwab, and M.K. Banks. 1992. The effects of organic acids on leaching of zinc from mining tailings. Agronomy Abstracts p. 63.
- Mahmoudjafari, M. G.J. Kluitenberg, A.P. Schwab, and J.L. Havlin. 1991. An analysis of variability of nitrogen mineralization. Agron. Abst. p. 293.
- Schwab, A.P., R. Lal, and M. Townsend. 1991. Degradation of atrazine in soil columns as affected by moisture and sterilization. Agron. Abst. p. 51.
- Sonon, L.S., A.P. Schwab, G.J. Kluitenberg, and R.B. Lal. 1991. Persistence and transport of alachlor, atrazine, and nitrate through saturated and unsaturated soil columns. Agron. Abst. p. 53.
- Sonon, L.S., P. Splichal, and A.P. Schwab. 1991. Factors affecting the soil extraction and C<sub>18</sub> enrichment of atrazine and alachlor. ASTM Analytical Methods in Agriculture, June 3, 1991, Atlantic City, NJ.
- Splichal, P.A., and A.P. Schwab. 1991. Atrazine and alachlor degradation in shallow Kansas aquifers. Proceedings from Nonpoint Source Pollution: The Unfinished Agenda. March 20-21, 1991, Tacoma, WA.
- Jayachandran, K., A.P. Schwab, and B.A.D. Hetrick. 1990. Separation of inorganic and organic phosphorus using acidified molybdate and isobutanol. Agron. Abst. p.251.
- Jones, R.D. and A.P. Schwab. 1990. Effects of 40 years of fertilization on nutrient uptake by brome. Agron. Abst. p. 271.
- Schwab., A.P. 1990. Application of MINTEQ to leachates from coal ash. Agron. Abst. p. 237.
- Sonon, L.S., and A.P. Schwab. 1990. Persistence and transport of atrazine and nitrate in fine- and coarse-textured soils in Kansas. Agron. Abst. p. 48.

- Splichal, P., L. Sonon, and A.P. Schwab. 1990. Factors affecting the soil extraction and C<sub>18</sub> enrichment of atrazine and alachlor. American Society of Agronomy Annual Meetings, San Antonio.
- Tomecek, M.B., A.P. Schwab, and P.D. Ohlenbusch. 1990. Fertility and pH change over time in coal ash waste. Agron. Abst. p.49.
- Tomecek, M.B., A.P. Schwab, and P.D. Ohlenbusch. 1990. Establishment of native plant species in coal ash wastes. American Society of Agronomy Annual Meetings, San Antonio.
- Bascom, N., and A.P. Schwab. 1989. Migration of contaminants through coal-ash wastes. Hazardous Waste Symposium, Kansas State University.
- Schwab, A.P. 1989. Movement of Nitrate and Atrazine Through Soil and into Groundwater. Water and the Future of Kansas. Kansas State University.
- Schwab, A.P., N. Bascom, and P.D. Ohlenbusch. 1989. Chemistry of leachates and extracts of revegetated coal ash. Agron. Abst. p. 44.
- Sonon, L., Jones, R.D., and A.P. Schwab. 1989. Movement of nitrate and atrazine in Kansas soils. Hazardous Waste Symposium, Kansas State University.
- Sonon, L. and A.P. Schwab. 1989. Nitrate and atrazine leaching in Kansas soils. Water and the Future of Kansas.
- Sonon, L., and A.P. Schwab. 1989. Leaching of atrazine in Kansas soils. Agron. Abst. p. 45.
- Tomecek, M., B.A.D. Hetrick, P.D. Ohlenbusch, and A.P. Schwab. 1989. Effect of vesicular- arbuscular mycorrhizae on the growth of selected plant species in high-pH coal ash. Agron. Abst. p. 46.
- Tomecek, M., P.D. Ohlenbusch, and A.P. Schwab. 1989. Use of cover crops in coal ash reclamation. Agron. Abst. p. 45.
- Schwab, A.P. 1988. The effects of long-term fertilization on the exchangeable cations and cation exchange capacity of soil. Soil Conservation Service Annual Regional Meeting, Salina, Kansas.
- Schwab, A.P. and M.D. Ransom. 1988. Changes in exchange properties of a soil as affected by long term fertilization. Agron. Abst. p.204.
- Hetrick, J.A. and A.P. Schwab. 1987. The influence of long term N and P fertilization on soil P Fractions. Agron. Abst. p.204.
- Jones, R.D. and A.P. Schwab. 1987. Balancing complex chemical equations: a user friendly program for applied scientists. Agron. Abst. p.48.
- Schwab, A.P. and R.D. Jones. 1987. Nitrate movement in a fine textured soil. Agron. Abst. p.163.
- Falatah, A.M., and A.P. Schwab. 1986. The effect of elemental sulfur on Zn and Fe in alkaline soils. Agron. Abst. p.198.
- Hetrick, J.A. and A.P. Schwab. 1986. Comparative physical-chemical mechanisms of phosphorus uptake in native and agronomic plants. Agron. Abst. p.202.
- Jones, R.D. and A.P. Schwab. 1986. Anion Leaching Associated With Excessive Nitrogen Fertilization. Agron. Abst. p.169.
- Schwab, A.P.. 1986. Manganese phosphate solubility in soils. Agron. Abst. p.172.
- Schwab, A.P. 1986. Interpretation of soil tests. Plant Pathology, Kansas State University.
- Owensby, C.E., A.P. Schwab and S. Kulyingyong. 1985. Effects of long-term application of NH<sub>4</sub>NO<sub>3</sub> on soil chemical properties. Agron. Abst. p. 181.
- Schwab, A.P. 1985. The effects of long-term fertilization on the chemical properties of a soil. University of Nebraska, Lincoln, NB.
- Schwab, A.P. and S. Kulyingyong. 1985. Phosphate movement in fertilized soils. Agron. Abst. p.151.
- Schwab, A.P. 1985. The effects of redox on the chemistry of Mn and Fe in soils. Dept. of Geol., Kansas State University.
- Felmy, A.R., and A.P. Schwab. 1983. Evaluation of thermodynamic data for aqueous species and solid phases of Pu. Amer. Chem. Soc. Symposium, Seattle, WA.
- Lindsay, W.L. and A.P. Schwab. 1981. The chemistry of iron in soils. Internat. Iron Conf. Provo, UT.

- Schwab, A.P. and W.L. Lindsay. 1981. The reduction and uptake of Fe chelated Fe(III) by chlorotic soybean roots. Internat. Iron Conf. Provo, UT.
- Lindsay, W.L., A.P. Schwab, and L.A. Banks. 1980. Comparison of theoretical and experimental redox relationships in soils. Agron. Abst. p.142.
- Schwab, A.P. and W.L. Lindsay. 1980. Theoretical and experimental effects of redox on iron and manganese solubility. Agron. Abst. p. 145.
- Soltanpour, P.N., S.M. Workman, and A.P. Schwab. 1978. Use of inductively- coupled plasma spectrometry for the simultaneous determination of macro and micro-nutrients in NH<sub>4</sub>HCO<sub>3</sub>-DTPA extracts of soils. Agron. Abst. p.163
- Schwab, A.P., and W.L. Lindsay. 1978. The effect of redox on the availability of chelated metals to plants. Agron. Abst. p.153.
- Schwab, A.P., and P.N. Soltanpour. 1977. Factors affecting the NH<sub>4</sub>HCO<sub>3</sub>-DTPA soil test. Agron. Abst. p.165.

## Research Assistants

### Former Graduate Students (current employment in parentheses) 15 Ph.D., 14 M.S.

- James Hetrick, Ph.D., 1986 (U.S. EPA. Wash DC)
- Abdulrazag Falatah, Ph.D., 1987 (Prof., King Faud Univ., Saudi Arabia)
- R.David Jones, Ph.D., 1987 (Research Director, Pesticides, U.S. EPA, Wash. DC)
- Rajendra Lal, Ph.D., 1990 (Prof., Allahabad Agric. Instit., India)
- Patrick Splichal, M.S., 1991 (Environmental Engineering Consultants, Kansas City, Mo.)
- Krishnaswamy Jayachandran, Ph.D., 1992 (National Tilth Lab., Ames , IA)
- Leticia Sarong-Sonon, Ph.D., 1992, (Assoc. Prof., Univ. Georgia)
- Abdul Al-Assi, M.S., 1993 (U.S. DoD, Ft. Riley, Kansas)
- Teresita Chua, M.S., 1993 (Iowa State Univ.)
- Zhi Chen, Ph.D., 1997 (AT&T)
- Yinghong He, Ph.D., 1997 (CH2M Hill)
- Jinbo Su, M.S. 1997. Medicinal Chemist, CVS Pharmacies.
- Dongsheng Zhu, Ph.D., 1997 (AT&T)
- Wendy Kyle, M.S., 1998 (Natl. Assoc. State Univ. & Land Grant Colleges)
- Karrie Rathbone, Ph.D. 1998, (Prof., Tabor College)
- Narcissus Magturo, M.S., 2001 (US Army Corps of Engineers)
- Yanjun Maggie Zhao, M.S., 2001. (Pharmaceuticals Consultant, Detroit MI.)
- Kevin Lewis, M.S. June, 2003, (Engineering Consulting)
- Jason Hickey, M.S., 2004. (Roux Environmental Consulting, New Jersey)
- Katy Euliss Chapman, Ph.D. 2004 (Assoc. Prof, Univ. of Minnesota, Crookston)
- Micah Humphries, PhD, 2007 (Asst. Prof., Northwest College, Powell, Wyoming)
- Agnes Szlezak, PhD, 2007 (Private Consulting, Germany)
- La Riva, Diana, M.S., 2009, (Save the Dunes Foundation, Indiana)
- Atkinson, Ben, M.S., 2009, (US Environ. Protection Agency)
- Jessica Johnston, M.S., 2012. (Monsanto)
- William A. Martin, Ph.D. 2014. (Engineering Research and Development Center, USACE)
- Moyer, David, M.S. 2015 (Environmental Services LLC)
- Igwe, Alexandria, M.S. 2015. (PhD candidate, UC Davis)
- Rathnayake, Sewwandi, Ph.D. 2018
- Dermody, Chris, M.S. 2018. Electronic Systems Mgmt. (private sector)
- Limon, Vanessa, M.S. 2019; City of Detroit, Water District
- Andrew Lee, M.S. 2020 (U.S. EPA, Region V Chicago)

Nasta Babirye, Ph.D. (2021)

Current Graduate Students (projected graduation date)

Paul, Jason, Ph.D. (2018)

Pandey, Aditi, Ph.D. (2021)

Undergraduate Student Research Assistants

Ashley Hountz

Janyne Little

Chris Swalley

Michelle Madden

Madeline Porterfield

Erin Buttrey

Maryellen Przybylinski

Taylor Alvarado

Franklin Linam

Michael Mullins

Monique Nugyen

Post-Doctoral Associates (6)

Rajendra Lal, 1991-1992

Edward Brannan, 1995

Xu Wang, 1995-1996

Peter Kulakow, 1995-1997

Baozhi Liu, 1998-1999

Aneela Iqbal, 2015-2016

Iqbal Ahmad, 2017- 2018

Visiting Scientists (3)

Mingming Sun, 2016-2017

Hongli Huang, 2017-2018

Kijune Sung, 2019-2020