

HazTech

T R A N S F E R

Great Plains/Rocky Mountain Hazardous Substance Research Center



The Holiday Inn Pyramid Hotel and Convention Center in Albuquerque will host the conference.

500 expected at joint conference in May

Speakers, session chairpersons, and registration details are all finalized for the Great Plains/Rocky Mountain Hazardous Substance Research Center (HSRC)/Waste-management Education & Research Consortium (WERC) Joint Conference on the Environment, to be held May 21-23 at the Holiday Inn Pyramid, Albuquerque, N.M. More than 500 participants are expected for the three-day event that will also feature five workshops before and after the principal focus of the conference. "Creating a New Path on the Santa Fe Trail" is this year's theme.

Opening day, Tuesday, May 21, plenary speakers will be Dr. Kathleen Garland, director of the Mining and Minerals Division of the New Mexico Department of Energy, Minerals and Natural Resources; and William S. Brack, president of Chino Mines Company, Phelps Dodge Corporation. The invited speaker for the Tuesday noon luncheon will be Dr. Robert Huggett, assistant administrator for EPA's Office of Research and Development. "On the Trail to Preventing Exposure and Reducing Risk" will be the topic addressed by William A. Suk, National Institute of Environmental Health Sciences Remediation Technologies, at a noon luncheon Wednesday.

A four-track program, Tuesday morning through noon Thursday, will offer sessions on numerous topics including: chemical technologies, organic contaminants, analytical methods, barriers and transport, modeling and transport, contaminant fate and transport, metals, nonaqueous phase liquids, bioremediation and volatile compounds, technology transfer and munitions-contaminated soils, technology transfer and field applications, technology transfer and training, and PCBs and the Mohawk

Nation Superfund site.

Tuesday evening, while left open for the majority of conference attendees to be able to sample the history and culture of the Albuquerque area, will feature a pizza social honoring students involved in HSRC and WERC projects. Wednesday evening will be highlighted by a reception and poster session, with 125 posters on display.

Workshops surrounding the event include "Beneficial Effects of Vegetation in Metals-Contaminated Soils," Monday, May 20; "Remediation of Munitions-Contaminated Soil and Water" and "Bioremediation Alternatives," Thursday, May 23; and "HAZWOPER 8-Hour Refresher Short Course" and "Selection of Remediation Technologies Short Course," May 23-24.

Conference brochures with registration details will be mailed in April to those associated with HSRC, WERC, and other affiliated conference sponsors. Information about the conference is also available on the World Wide Web at:
<http://www.engg.ksu.edu/HSRC/home.html>.

On page...

Articles

Update of center activities	2
Book review	3
Kansas gets cleanup award.....	3
Workshops, conferences	7

Regular features

Consortium directory	3
Project profile.....	4
Center profile: Lee Peyton.....	6
Calendar.....	8

April 1996

HSRC *Update* on center activities

R2D2 program puts professional development and resumes in cyberspace

The national coordination office for the R2D2 program will conduct a professional development seminar, titled "Environmental Professionals and Society: Current and Future Needs in Research, Industry, and Public Service," at the HSRC/WERC Joint Conference on the Environment.

The seminar will be held the evening of May 20, prior to the start of the general session of the conference, May 21-23. Approximately 15 environmental professionals who are leaders in research, industry, and public service will attend the seminar. In addition to R2D2 students, former DOD and DOE students enrolled in programs of the Waste-management Education and Research Consortium programs will also attend. The R2D2 program offers a number of professional development opportunities for displaced DOD persons during the course of their degree program.

One goal of the R2D2 program is to facilitate job internship placement for R2D2 students. A key part of this effort involves developing a resume portfolio linked to the World Wide Web. The national coordination office will electronically send resume templates to R2D2 students for completion and placement in the portfolio.

Prospective employers can screen and identify potential employees using key word searches. The portfolio will be linked to R2D2 and HSRC program home pages on the Internet, and will be downloaded on disks or in hard copy at the request of potential employers.

The resumes will also be linked to other organization home pages to maximize exposure in the many potential job markets.

NAOMI/HERS will support three researchers this summer and send 16 to conference

The HSRC Native American and Other Minority Institutions (NAOMI) program, developed as a part of the EPA Minority Academic Institution (MAI) project, continues to move forward and accomplish its goals in the face of funding uncertainty.

Through the NAOMI program, the Haskell Environmental Research Studies (HERS) Center is supporting three individuals who will work on university research projects during the 1996 Summer Cooperative Research Program.

Mark Peacock, Cheyenne River Community College, will be at the University of Colorado; and Miranda Salt, Navajo Community College, and Jamison Bear, Haskell Indian Nations University, will be at Kansas State University.

In addition, 16 individuals will be attending the HSRC/WERC Joint Conference on the Environment, May 21-23, in Albuquerque, N.M., with support from the NAOMI Conference Attendance Assistance Program.

Haskell to broadcast first live satellite show

On April 11, 1996, Haskell Indian Nations University (HINU) will broadcast its first live satellite program from its Lawrence, Kan., campus. Entitled "Environmental Legacy for Our Grandchildren," the program is sponsored by the NAOMI Seminar Program and the HERS Center and will examine environmental issues affecting various tribes in Wisconsin, Oklahoma, South Dakota, and New Mexico. Viewers will be able to participate by telephone in a dialogue with tribal environmental officials on-site and a panel of Native American environmental professionals in HINU's television studio.

The program will be broadcast live on April 11 from 2 to 3:30 p.m. (CST). Interested persons will need a KU-band satellite receiver to take part in this conference. There are no participation fees and the program can be downlinked by tuning in to satellite K2. Contact Wendy Griswold at 913-749-8498 for more information.

TOSC evaluation grant awarded

The EPA HSRC centers program recently awarded Dr. James Dearing of Michigan State University a grant to evaluate the effectiveness of the Technical Outreach Services for Communities (TOSC) program.

TOSC is an EPA pilot project that leverages university resources, HSRC research, and federal and local resources to assist communities in understanding the science and technology involved in remediating hazardous waste sites.

Dearing has been charged with evaluating qualitatively and, to the extent possible, quantitatively the successes of the TOSC pilot program. The project is currently underway and should be completed by the end of this year.

Chemodynamics now available in second edition

Chemodynamics by Louis Thibodeaux, first published in 1979, has been used widely as a textbook in classes on chemical fate and transport in the environment.

An expanded second edition, *Environmental Chemodynamics: Movement of Chemicals in Air, Water, and Soil*, is now available with 50 percent more exercises and example problems and several new sections.

Chapter topics include equilibrium at interfaces; chemical exchange between air and water, water and earthen material, and air and soil; and intraphase chemical transport and fate.

Professionals will appreciate the appendices which contain

conversion factors, physical properties and constants, and chemical and environmental data.

All chapters have been updated because of significant progress in environmental science and engineering since 1979. In addition to its classroom use for seniors and graduate students, the author and his coworkers have taught this material to many professionals at over 50 short courses.

Environmental Chemodynamics, Second Edition, by Louis J. Thibodeaux, John Wiley & Sons, 605 Third Ave., New York, NY 10158-0012. 593 pp. \$69.95. ISBN 0-471-61295-2.

Reviewed by Larry E. Erickson

Kansas recognized for Superfund cleanup efforts

A Kansas Department of Health and Environment program that helps Kansas cities clean up contaminated sites and keep them off the federal Superfund list has been recognized by the Council of State Governments as one of ten Midwest finalists for the annual Innovative Awards Program.

"At a time when relatively few Superfund sites have been cleaned up, the KDHE Deferral Program has helped get cleanups underway and prevent communities from being labeled as Superfund sites," said Kansas Governor Bill Graves. "These kind of efforts show that the state government can live within its means and still meet our needs."

The Deferral Program expe-

ditions cleanups by offering potentially responsible parties and cities an alternative to Superfund listing. The state action protects the local economy, absolves innocent property owners, and preserves the property tax base.

Under the program, cities become the lead partner in the agreement, assuming the financial responsibility and local oversight for cleaning up contamination. The work can proceed quicker and more economically. The cities are allowed to seek compensation from identified responsible parties. The program has been used in Wichita, Hutchinson, and Salina, and another agreement is currently being negotiated with the city of Hays.

Consortium Directory

Our World Wide Web address is:
<http://www.engg.ksu.edu/HSRC/home.html>

Key personnel at each university are:

Kansas State University
 Larry Erickson, 913-532-4313/2380*
 Dick Hayter, 913-532-6026**
 Stan Grant, 913-532-7495
 J. Patrick McDonald, 913-532-7496
 Diana Tillison, 316-686-9274
 Carla Wolfe, 913-532-7464
 Rita McDonald, 913-532-6519
 Alison Hodges, 913-532-6027
 Blase Leven, 913-532-0780
 FAX: 913-532-5985

Haskell Indian Nations Univ.
 George Godfrey, 913-749-8428 * **

Lincoln University
 Mary Wyatt, 314-681-5173 * **

Montana State University
 Al Cunningham, 406-994-6109* **

South Dakota State University
 Vern Schaefer, 605-688-6307* **

University of Iowa
 Jerry L. Schnoor, 319-335-5646*
 Burt C. Kross, 319-335-4423**

University of Missouri-Columbia
 Shankha K. Banerji, 314-882-3610*
 Richard Potter, 314-882-3469**

University of Missouri-Rolla
 Tom J. O'Keefe, 314-341-4358*
 Allen W. Hatheway, 314-341-4777**

University of Montana
 Jerry J. Bromenshenk, 406-243-5648*
 Chris Heyer, 406-243-7876**

Montana Tech
 Karl Burgher, 406-496-4410* **

University of Nebraska-Lincoln
 William Kelly, 402-474-2371*
 Larry Hammer, 402-472-2844**

University of Utah
 Sam Ghosh, 801-581-6931*

Utah State University
 Ron Sims, 801-797-6069*
 Ryan Dupont, 801-797-3227**

University of Wyoming
 George Vance, 307-766-2297 *
 Roger Wilmot, 307-766-5353 **

*—research
 **—technology transfer



Editor
 Mary Rankin
Technical Writer
 J. Patrick McDonald
Production Manager
 Mike Dorcey
Graphics and Design
 Rich Gardner

HazTech Transfer is published quarterly by the Great Plains/Rocky Mountain Hazardous Substance Research Center, Regions 7 & 8, at Kansas State University, Manhattan, KS 66506, to serve as a means of communication and a forum for members of the center's consortium partners and researchers and the public. The Office of Research and Development, USEPA, under agreement R-819653, provides 70 percent of the funding for this program and this publication. The content of this publication does not necessarily represent the views of that agency.

Researchers study remediation of NAPL contaminants

By **J. Patrick McDonald**

Organic constituents are common contaminants at hazardous waste sites. Organic compounds are often found dissolved in ground water and sorbed to soil, and increasingly, they are found in a distinct organic phase. These non-aqueous phase liquids (NAPLs) present unique difficulties in developing effective remediation schemes. Drs. L.E. Erickson and L.T. Fan have recently studied the remediation of NAPL contaminants.

Research findings

The researchers developed three models to identify rate limiting phenomena in NAPL-contaminated soils, the diffusive, advective, and equilibrium models.

The diffusive model examines the remediation of a shrinking NAPL front. The model can be applied either to a NAPL deposit in a single pore, or to a NAPL-saturated aggregate porous medium. The model utilizes the classic Stefan problem to track the moving NAPL front. Limiting case analysis indicates that NAPL solubility is the determinant of whether oxygen or NAPL transport is rate limiting.

The advective model considers discrete NAPL blobs trapped within a continuous aqueous phase in a homogeneous isotropic aquifer. This model also indicates that NAPL dissolution is a primary rate controlling factor.

The equilibrium model examines similar technologies while making several simplifying assumptions.

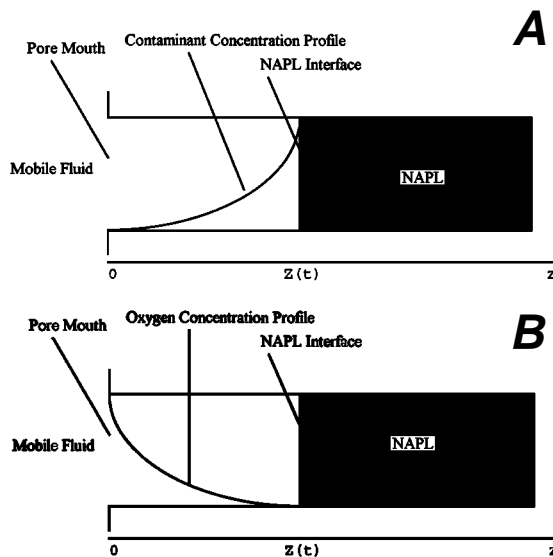


Fig. 1 depicts the conceptualization of the diffusive model for (A) extraction and (B) bioremediation of NAPL deposits from within a pore.

They further demonstrate that for multi-component mixtures, a bio-enhanced extraction treatment system greatly improves performance. The highly soluble contaminants are quickly removed by extraction, and the slightly soluble contaminants removed by biological activity. The results are clearly compatible with the other models.

Potential development

Since this research studies NAPL phenomena at a fundamental level, it has broad application across a variety of remediation schemes. The researchers used the developed models to examine rate limiting phenomena for several technologies, including extraction (pump-and-treat, vapor extraction), bioremediation, and bioventing. The resulting models provide insight into the rate-limiting factors for any of the remediation technologies given appropriate site specific data. This insight can result in better design of remediation treatment systems.

Principal investigators

Dr. L.E. Erickson, director, Great Plains/Rocky Mountain HSRC and professor, and Dr. L.T. Fan, professor and head, both in the Department of Chemical Engineering, Kansas State University, Manhattan, KS 66506.

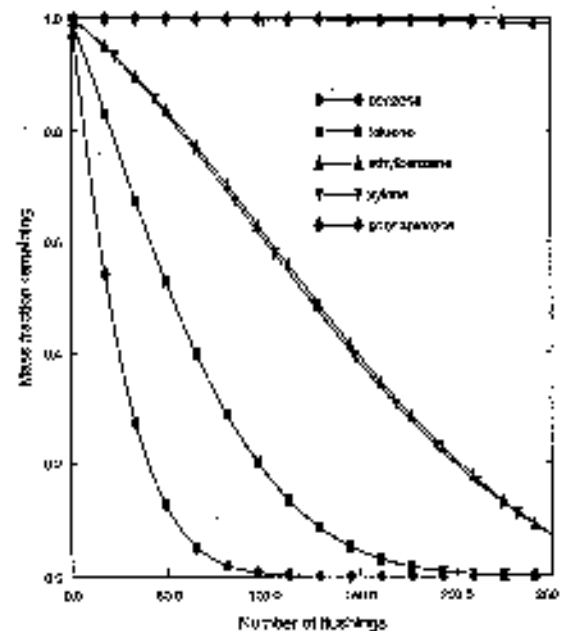


Fig. 2 reflects the performance of bio-enhanced extraction predicted by the equilibrium dissolution model on a BETXP NAPL-contaminated aquifer.

Publications

Yang, X., L.E. Erickson, and L.T. Fan, 1993. "Mass Transfer in the Bioremediation of Soils Contaminated with Trapped Nonaqueous Phase Liquids," Proceedings of the 23rd Annual Biochemical Engineering Symposium, R.G. Harrison, Ed., Norman, Oklahoma, pp. 110-119.

Yang, X., L.E. Erickson, and L. T. Fan, 1993. "Transport Properties of Toluene as a Nonaqueous Phase Liquid in Ground Water," Proceedings of the 8th Conference on Hazardous Waste Research, Manhattan, Kansas, pp. 313-330.

McDonald, J.P., C.A. Baldwin, L.E. Erickson, and L. T. Fan, 1993. "Modeling Bioremediation of Soil Aggregates with Residual NAPL Saturation," Proceedings of the 8th Conference on Hazardous Waste Research, Manhattan, Kansas, pp. 346-365.

Yang, X., L.E. Erickson, and L.T. Fan, 1994. "Dispersive-Convective Characteristics in the Bioremediation of Contaminated Soil with a Heterogeneous Formation," *Journal of Hazardous Materials*, 38: 163-185.

Gandhi, P., L.E. Erickson, and L.T. Fan, 1994. "A Simple Method to Study the Effectiveness of Bioremediation Aided, Pump-and-Treat Technology for Aquifers Contaminated by Nonaqueous Phase Liquids, I. Single Component Systems," *Journal of Hazardous Materials*, 39: 49-68.

Yang, X., L.E. Erickson, and L.T. Fan, 1995. "A Study of Dissolution Rate Limited Bioremediation of Soils Contaminated by Residual Hydrocarbons," *Journal of Hazardous Materials*, 41:299-313.

Gandhi, P., L.E. Erickson, and L.T. Fan, 1995. "A Simple Method to Study the Effectiveness of Bioremediation Aided, Pump-and-Treat Technology for Aquifers Contaminated by Nonaqueous Phase Liquids, II. Multi-Component Systems," *Journal of Hazardous Materials*, 41: 185-204.

Santharam, S.K., L.E. Erickson, and L.T. Fan, 1994. "Modeling the Fate of Polynuclear Aromatic Hydrocarbons in the Rhizosphere," Proceedings of the 9th Annual Conference on Hazardous Waste Remediation, Montana State University, Bozeman, MT, pp. 333-350.

Gandhi, P., X. Yang, L.E. Erickson, and L.T. Fan, "In-Well Aeration: An Innovative Subsurface Remediation Technology," Proceedings of the 24th Annual Biochemical Engineering Symposium, R.H. Davis, Ed., pp. 1-10, University of Colorado, Boulder, CO (1994).

Santharam, S.K., L.E. Erickson, and L.T. Fan, "Modeling the Fate of Pyrene in the Rhizosphere," Proceedings of the 24th Annual Biochemical Engineering Symposium, R.H. Davis, Ed., pp. 119-128, University of Colorado, Boulder, CO (1994).

Yang, X., L.E. Erickson, and L.T. Fan, 1996. "A Discrete Blob Model of Contaminant Transport in Ground Water with Trapped Nonaqueous Phase Liquids," submitted to *Chemical Engineering Communications*, in press.

Yang, X., L.E. Erickson, and L.T. Fan, 1996. "A Bench Scale Study on Biodegradation and Volatilization of Ethylbenzoate in Aquifers," Submitted to *Journal of Hazardous*

Materials, in press.

Yang, X., L.T. Fan, and L.E. Erickson, 1995, "A Conceptual Study on the Biowall Technology: Feasibility and Process Design," *Remediation*, pp. 55-67..

McDonald, J. Patrick, 1994. "Transport Limitations Associated with Traditional and Innovative Sub-Surface Remediation Technologies," M.S. thesis, Kansas State University, Manhattan, Kansas.

Gandhi, Prashant, 1994. "Role of Biodegradation in Traditional and Innovative Subsurface Remediation Technologies," M.S. thesis, Kansas State University, Manhattan, Kansas.

Yang, Xiaoqing, 1995. "Characterizing *in Situ* Bioremediation of Organic Contaminated Soils," Ph.D. dissertation, Kansas State University, Manhattan, Kansas.

Santharam, Satishkumar, 1996. "A Modeling Study of the Role of Vegetation and Surfactants in Remediating Soil Contaminated with Polycyclic Aromatic Hydrocarbons," M.S. thesis, Kansas State University, Manhattan, Kansas.

Although the projects described in this article have been funded in part by the U.S. Environmental Protection Agency under assistance agreement R-819653, through the Great Plains-Rocky Mountain Hazardous Substance Research Center, it has not been subjected to the agency's peer and administrative review and, therefore, may not reflect the views of the agency. No official endorsement should be inferred.

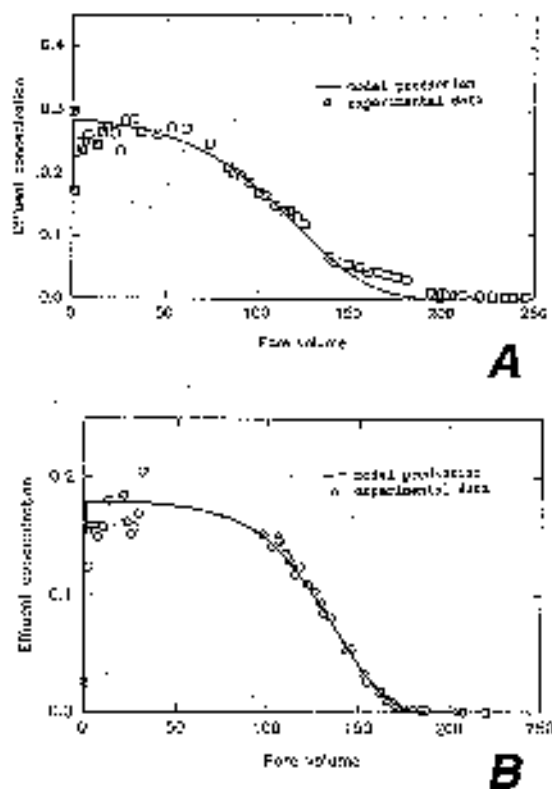


Fig. 3 demonstrates the advective model prediction of toluene dissolution from a glass bead column: (A) $U = 5$ m/d, (B) $U = 10$ m/d.

Experimental data for comparison is from Geller, J.T., Dissolution of Nonaqueous Phase Organic Liquids in Porous Media, Ph.D., dissertation, University of California, Berkeley, 1990.

Peyton directs University of Missouri-Columbia center focused on waste management

By Mary Rankin

The Center for Waste Management (CWM) at the University of Missouri-Columbia is under the direction of Dr. Lee Peyton, associate professor of civil engineering. Created in 1995, its purpose is to promote research and applications, technology transfer and development, and education and training in environmental and waste management.

The current focus of the center, Peyton said, is in the areas of control and treatment, minimization and pollution prevention, monitoring and assessment, recovery and reuse, remediation, and ultimate disposal.

With nearly 70 faculty participating in the center from 15 different departments and five colleges on campus, Peyton said the CWM is emphasizing several areas of expansion and outreach including partnerships with Missouri businesses for environmental research and applications; participation in national research programs that includes pursuing national funding opportunities and establishing interuniversity collaboration with research teams from other universities; and developing strong international ties. At present the center has



research agreements with two universities in China, one environmental company in the United Kingdom, and initiatives underway in both the Asia-Pacific region and Russia.

In the area of education and training, the center is planning to launch a new distance learning initiative in the fall of 1996. "This will involve teaching graduate courses in environmental/waste management using innovative distance learning technologies," he explained.

"Creating an environmental center such as this from the beginning requires many long and hectic days."

Peyton has been with the department of civil engineering at Columbia since 1985. He received his B.S. from Louisiana Tech University, his M.S. from the University of Texas at Austin, and his Ph.D. from Colorado State University, all in civil engineering. As "highlights" of his career, he lists two national awards from ASCE for papers he co-authored with Dr. Paul Schroeder, U.S. Army Corps of Engineers, the Wesley Horner Award and the Rudolph Hering Medal. The primary focus of his research has been related to the understanding of subsurface water and chemical movement.

The Great Plains/Rocky Mountain Hazardous Substance Research Center has funded research at the center for Drs. Rakesh Bajpai, Shankha Banerji, and Robert Segar in the area of bioremediation; and for Drs. Tom Clevenger, Bajpai, Banjeri, and Peyton in the area of fate and transport of chemicals in soil and ground water.

"Creating an environmental center such as this from the beginning," Peyton said, "requires many long and hectic days. But it has also been fun to start with a blank slate and few restrictions, shaping the direction and scope, assembling and collaborating with such a large group of extraordinary faculty, brainstorming ideas, envisioning potential, finding and creating opportunities—and eventually watching success roll in."

As part of a continuing series on the holdings of the Hazardous Substance Research Center repository, following is a partial list of holdings available for checkout or interlibrary loan from Farrell Library at Kansas State University (KSU). This list is of some of the most recent acquisitions.

Floppy disk copies of the entire list of holdings are also available. To request a disk copy of the list, write to Repository List, HSRC, Kansas State University, 101 Ward Hall, Manhattan, KS 66506-2502, 913-532-6519, FAX 913-532-5985.

Rec# 1106. Bioremediation of Munitions-Contaminated Soil: Part 5a. Army National Test Site Program; Part 5b. Western Governors' Association Military Munitions Waste Working Group Plan for Field Demonstrations with Stakeholder Participation. VHS tape.

Rec# 1107. Gandhi, Prashant. Role of Biodegradation in Traditional and Innovative Subsurface Remediation Technologies. Manhattan, KS: Kansas State University, 1994. Thesis, 130 pp.

Rec# 1108. Narayanan, Muralidharan. Experimental and Modeling Studies on Bioremediation of Organic Contaminants in the Presence of Alfalfa Plants. Manhattan, KS: Kansas State University, 1994. Thesis, 138 pp.

Rec# 1109. Shetty, Kateel Giridhara. Relationship Between Mycorrhizal Symbiosis and Zinc Tolerance in Plants. Manhattan, KS: Kansas State University, 1994. Thesis, 100 pp.

Rec# 1110. Watanabe, Hirozumi. Alachlor and Atrazine Losses from Runoff and Erosion in the Blue River Basin. Manhattan, KS: Kansas State University, 1993. Thesis, 170 pp.

Rec# 1111. Orzechowska, Grazyna E. & Poziomek, Edward J. Potential Use of Ultrasound in Chemical Monitoring. Las

Vegas, NV: Environmental Monitoring Systems Laboratory, 1994. 38 pp.

Rec# 1112. Science Applications International Corporation. 21st Annual RREL Research Symposium Abstract Proceedings. Cincinnati, OH: Risk Reduction Engineering Laboratory, 1995. 385 pp.

Rec# 1113. Kirk, Diana & Alvarez, Franklin. Pollution Prevention Case Studies Compendium, 2nd edition. Cincinnati, OH: Risk Reduction Engineering Laboratory, 1995. 53 pp.

Rec# 1114. Pollution Prevention Institute. Pollution Prevention Services and Equipment; A Vendor Directory. Manhattan, KS: Kansas State University, 1995. 33 pp.

Rec# 1115. Pollution Prevention Institute. CFC's, A Handbook for Small Business. Manhattan, KS: Kansas State University, 1994. 10 pp.

Rec# 1116. Berscheid, Mark. Remedial Technology Applications Matrix for Soils and Sludges. Sacramento, CA: Department of Health Services, Remedial Technology Unit, Alternative Technology Division, 1991. 16 pp.

Rec# 1117. Environmental Health Reference Collection. Geneva: World Health Organization, 1994. 61 pp.

Rec# 1118. Roadmap to Environmental Permits Required by the Division of Environment. Topeka, KS: Kansas Department of Health and Environment, 1995. 19 pp.

Rec# 1119. Auto Body Surface Coating: A Practical Guide to Reducing Air Emissions. Small Business Pollution Prevention Center, University of Northern Iowa, 1994. 50 pp.

Rec# 1120. Pollution Prevention Manual for Lithographic Printers. Cedar Falls, IA: Iowa Waste Reduction Center, University of Northern Iowa, 1995. 68 pp.

Rec# 1121. Waste Reduction Advice for Farm Equipment Manufacturers. Cedar Falls, IA: Iowa Waste Reduction Center, University of Northern Iowa, 1991.

HSRC *Update* on workshops and conferences

Workshops

The University of Colorado at Boulder, College of Engineering and Applied Science, under a DoD grant program, is offering free training and education in waste management and environmental restoration for qualified applicants May 15-17.

The Hazardous Waste Management Workshop is designed for displaced DoD military or civilian personnel. Interested persons can contact Janet Yowell, by phone: 303-492-5230, or e-mail: janet@cadswes.colorado.edu, for further information. Registration deadline is May 1.

The goal of the workshop is to introduce qualified students to the latest principles of hazardous waste management.

Conferences

The **1996 International Ecological Congress** will be held in Voronezh, Russia, Sept. 22-28. Hosted by the Voronezh State Academy of Technology, assisted by Kansas State University, the conference will focus on the main recommendations of the

Memorandum from the 1992 United Nations Conference on Environment and Development, and will feature panel discussions, formal presentations, poster sessions and more. Main topical areas include science and the environment, ecological economics, environmental policy, and environmental education.

For more information, contact Dr. Bettie Minshall by phone: 913-532-5575; fax: 913-532-5637; or E-mail: minshal@dce.ksu.edu.

The Midwest Section of the Air & Waste Management Association is hosting a technical conference in Kansas City, Mo., Sept. 26-27, 1996. In a format of presentations and panel discussions, the conference will provide a forum for information exchange on a range of environmental issues including air quality, waste issues, environmental data management, and business outlook. Questions on the meeting can be directed to Edward Ruddy, by phone: 816-822-3410; fax: 816-822-3415; or e-mail: eruddy@burnsmcd.com.

Calendar

April 21-25—'96 Environmental Design Contest, Las Cruces, NM; Waste-management Education & Research Consortium (WERC), Kay Perkins, 505-646-7707.

April 25—Solvent Alternative Expo, Salina, KS; Kansas State University, Tim Piero, 913-532-4995.

April 25—HAZWOPER Refresher, Overland Park, KS; Center for Environmental Education and Training, Shirley Welhoelter, 913-897-8527.

April 26—Contractor/Supervisor Refresher, Lawrence, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

May 1—Project Designer Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

May 2—Contractor/Supervisor Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

May 3—Inspector/Management Planner Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

May 6-10—Lead Abatement Training for Supervisors and Contractors, Overland Park, KS; Mid-States Rocky Mountain Regional Lead Training Center, Stacy Milliman, 913-897-8524.

May 14-16—Certified Hazardous Materials Manager Review, Overland

Park, KS; Univ. of Kan. Center for Environmental Education and Training, Shirley Welhoelter, 913-897-8527.

May 15-17—Hazardous Waste Management Workshop for Displaced DoD Professionals, Boulder, CO; Univ. of Colo./WERC, Janet Yowell, 303-492-5230.

May 20-24, 1996—HSRC/WERC Joint Conference on the Environment, Albuquerque, NM; Great Plains/Rocky Mountain HSRC, Carla Wolfe, 913-532-7464.

May 20-24—HAZWOPER 40-Hour Course, Columbia, MO; Univ. of Mo.-Columbia, John Atkinson, 314-882-8880.

May 21—HAZWOPER Refresher, Columbia, MO; Univ. of Mo.-Columbia, John Atkinson, 314-882-8880.

May 21-22—Real Estate Site Assessment Phase I, Salt Lake City, UT; Univ. of Mo.-Columbia/ASTM, John Atkinson, 314-882-8880.

May 27-31—Unexploded Ordnance Detection and Range Remediation Conference, Albuquerque, NM; Yuma Proving Ground and the Army Environmental Center, Dr. Shyam Gurbaxani, 505-846-4604.

May 30—Contractor/Supervisor Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

May 31—Inspector/Management

Planner Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

June 6—Lead Inspector Refresher, Overland Park, KS; Mid-States Rocky Mountain Regional Lead Training Center, Stacy Milliman, 913-897-8524.

June 7—Lead Supervisor/Contractor Refresher, Overland Park, KS; Mid-States Rocky Mountain Regional Lead Training Center, Stacy Milliman, 913-897-8524.

June 11-13—Hazardous Materials Emergency Response, Overland Park, KS; Univ. of Kan. Center for Environmental Education and Training, Shirley Welhoelter, 913-897-8527.

June 21—HAZWOPER Refresher, Overland Park, KS; Univ. of Kan. Center for Environmental Education and Training, Shirley Welhoelter, 913-897-8527.

June 25-26—Risk-Based Corrective Action, Wichita, KS; Univ. of Mo.-Columbia/ASTM, John Atkinson, 314-882-8880.

June 28—Inspector/Management Planner Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

July 12—Inspector/Management Planner Refresher, Overland Park, KS; National Asbestos Training Center, Barbara Miles, 913-897-8549.

HazTech

T R A N S F E R

Great Plains/Rocky Mountain Hazardous Substance Research Center
101 Ward Hall, Kansas State University
Manhattan, KS 66506-2502



Nonprofit Organization
U.S. Postage Paid
Permit #525
Manhattan, KS 66502