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PARSONS ENGINEERING SCIENCE, INC.

10521 Rosehaven Street • Fairfax, Virginia 22030 • (703) 591-7575 • Fax: (703) 591-1305

November 11, 1994

Mr. Garth Connor
EPA Project Manager (3HW23)
U.S. Environmental Protection Agency
841 Chestnut Street
Philadelphia, PA 19107

Re: Request for Scheduling of a Technical Presentation on Capping and
Solidification/Stabilization at the USEPA Region III Office,
Tuesday, December 13, 1994

Dear Garth:

Parsons Engineering Science, Inc. (Parsons ES) is interested in providing a technical presentation on the use of containment remedies [i.e. capping and solidification/stabilization (S/S) technologies] at Superfund sites. I believe that this presentation will be an extremely valuable tool for yourself and other Region III technical staff involved with site remediation activities.

As part of the presentation, Parsons ES has invited two independent experts in the field of capping and S/S to share their knowledge with the group. Dr. David Daniel, University of Texas, is an expert in capping issues. Dr. Daniel has made presentations to all ten USEPA regional offices on the use of capping at hazardous waste sites. Dr. Paul Bishop, University of Cincinnati, is an expert on S/S, has been a technical reviewer of USEPA published reports on S/S of Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) waste, and has recently co-authored a book on innovative site remediation technologies using S/S. Biographies of both experts are included as Attachment 1.

As you are aware, the scheduling of these two experts to attend and make presentations at the same time was a difficult task. To successfully initiate this process, I am requesting an appointment to present this technology information for **Tuesday, December 13, 1994, from 9:00 to approximately 11:30 a.m. in the USEPA Region III offices.** I have attached a draft agenda (Attachment 2) of the proposed presentation. The presentation will be entirely technical in nature and will be completely generic. The intent of the presentation is to give you and other USEPA staff an opportunity to learn of some of the new innovations in the field of cover systems and S/S technologies. Site specific remedy selection will not be a part of this presentation.

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I believe that the technical presentation will provide an excellent forum for learning and discussing these types of technology applications. A good portion of our discussion will relate to the use of these technologies and how they achieve protection of human health and the environment. Thus, we would encourage USEPA risk assessment and BTAG staff to attend. Please review the enclosed materials and contact me at (804) 460-4453 with your questions and concerns. We will need to finalize the date and time as soon as possible.

Sincerely,

PARSONS ENGINEERING-SCIENCE, INC.

Susan K. Fullerton /alt

Susan K. Fullerton, P.E.
Project Manager

JS:jt

Enclosures

cc: Dave Babcock, Parsons ES-Syracuse
John Segna, Parsons ES-Fairfax
Amy Tarleton, Parsons ES-Fairfax

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ATTACHMENT 1

BIOGRAPHIES

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PAUL L. BISHOP

EDUCATION:

<u>Degree</u>	<u>Field</u>	<u>Institution</u>	<u>Date</u>
B.S.C.E.	Civil Engineering	Northeastern University	1968
M.S.C.E.	Environmental Engineering	Purdue University	1970
Ph.D.	Environmental Engineering	Purdue University	1972

UNIVERSITY EXPERIENCE:

<u>Rank</u>	<u>University</u>	<u>Dates</u>
Professor of Environmental Engineering; University Coordinator for Interdisciplinary Environmental Research and Education	University of Cincinnati	1993 - Present
William Thoms Professor and Head of Civil and Environmental Engineering	University of Cincinnati	1987 - 1993
Professor	University of New Hampshire	1982 - 1987
Guest Professor	Technical University of Denmark Lyngby, Denmark	1986 - 1987
Visiting Professor	Cornell University	1981, 1982, 1985 (Summers)
Associate Professor	University of New Hampshire	1976 - 1982
Associate Professor and Chairman	University of New Hampshire	1977 - 1980
Visiting Professor	Heriot-Watt University Edinburgh, Scotland	1980
Assistant Professor	University of New Hampshire	1972 - 1976

PROFESSIONAL EXPERIENCE:

<u>Position Title</u>	<u>Company</u>	<u>Dates</u>
Environmental Engineering Consultant		1972 - Present

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County Sanitarian	Tippecanoe County Health Dept. Lafayette, Indiana	1971 - 1972
Environmental Engineer	Metcalf & Eddy Engineers, Inc. Boston, Massachusetts	1968
Cooperative Engineer	Metcalf & Eddy Engineers, Inc. Boston, Massachusetts	1964 - 1967

REPRESENTATIVE CONSULTING EXPERIENCE:

<u>Description</u>	<u>Dates</u>
Tannery wastewater treatment, Suncook Leathers, Inc., Pittsfield, NH	1972 - 1987
Hydrologic studies, Sherburne Village, Merrimack, NH	1972 - 1973
Design of sanitary landfill, Moultonboro, NH	1973
Hydrologic studies, Colonial Chateau of Exeter, NH	1973
Design of a metal plating waste treatment system, Janco Sales, Inc., Barrington, NH	1974 - 1976
Tannery wastewater treatment, United Tanners of Dover, Dover, NH	1975 - 1976
Consultation on waste treatment, Simplex Wire and Cable Co., Inc., Portsmouth, NH	1976 - 1981
Studies on groundwater pollution, Bartlett, NH	1976
Pollution from silage operations, Amherst, NH	1976
Design of water treatment system, Fiber Process Division, Lydall, Inc., Rochester, NH	1976 - 1977
Design of a sanitary landfill, Newmarket, NH	1977
Consultation on laundry waste treatment, Dover, NH	1977
Evaluation of activated sludge aeration equipment, Wolfeboro, NH	1977
Design of waste treatment facilities for a diatomaceous earth mining and processing plant, Lake Umbagog, NH	1977
Design of a waste treatment facility for lithographic wastes, Concord Litho Co., Concord, NH	1978
Evaluation of possible utilization of pulp mill sludges, Garden State Paper Co., Inc. Garfield, NJ	1978

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Evaluation of waste treatment facilities for metal plating wastes, Franklin Electroplating, Dover, NH	1980 - 1982
Evaluation of waste treatment facilities for metal plating wastes, New England Circuits Merrimack, NH	1980 - 1982
Evaluation of the Stablex hazardous waste solidification process, Hooksett, NH	1980 - 1981
Design of a tannery sludge landfill, Suncook Leathers, Inc., Pittsfield, NH	1981 - 1982
Evaluation of paint sludges as a hazardous waste, Donnelly Manufacturing Co., Inc., Exeter, NH	1982 - 1983
Design of metal plating waste recovery system, Jewell Electrical Instruments, Inc., Manchester, NH	1983
Design of a metal plating waste treatment system, Green Mountain Metal Finishers, Bradford, Vermont	1983
Regional solid waste management plan, Tri-County Solid Waste Management District, Manchester, NH	1984 - 1985
Hazardous waste study, Davidson Rubber Division, Farmington, NH	1984
Waste management study, Coastal GFRC, Inc., Hooksett, NH	1985
Expert witness, A.C. Lawrence Leather Co., Inc., South Paris, ME	1985
Design of a metal plating waste treatment system, Enterprise Systems Corp., Dover, NH	1985
Design of a land application wastewater treatment system, Seacoast Engineering Associates, Inc., Stratham, NH	1986
Review of Soliditech, Inc. solidification/stabilization process, PRC Environmental Management, Inc., Chicago, IL	1988 - 1989
Technical Advisory Board, Warzyn Engineering, Inc., Madison, WI	1991 - Present
Solidification/stabilization engineering bulletin, SAIC, McLean, VA	1991
Stabilization with soluble phosphates, Wheelabrator Environmental Systems, Hampton, NH	1992 - 1993
Solidification/stabilization consulting, Chemical Waste Management, Geneva, IL	1992
Solidification/stabilization consulting, Warzyn, Inc., Madison, WI	1994

PROFESSIONAL REGISTRATION:

Registered Professional Engineer in the State of New Hampshire.

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PROFESSIONAL ORGANIZATIONS:

American Academy of Environmental Engineers
 Member of Board of Trustees, 1988 - 1991
 Seminars Committee - Chair, 1988 - 1989
 Education Committee - Chair, 1989 - present

Water Environment Federation (formerly WPCF)
 Sludge Management Program Subcommittee, 1989 - 1993
 Chair, 1991-1993
 Hazardous Waste Committee, 1984 - 1993

American Society of Civil Engineers
 Hazardous Waste Committee, 1981 - present
 Cincinnati Section - Environmental Engineering Group
 Management Group

Association of Environmental Engineering Professors
 Past President, 1993-1994
 President, 1992-1993
 Vice President, 1991-1992
 Member of the Board of Directors, 1991-1994
 Audit Committee - Chair, 1976 - 1977
 AAEE Liaison - Chair, 1988 - 1991

International Association on Water Quality (formerly IAWPRC)
 Specialist Group on Biofilm Systems, 1991 - present
 Management Group, 1994 - present
 Specialist Group on Environmental Engineering Education, 1993 - present
 Chair, 1994 - present

U.S.A. National Committee (USANC)
 AEEP Representative, 1994-2002
 USANC Founders Award Committee Chair, 1994-1995

American Society for Engineering Education
 Accreditation Board for Engineering and Technology (ABET)
 Alternate Director, 1991 - 1994

Sigma Xi
 Tau Beta Pi
 Chi Epsilon

EDITORIAL AND ADVISORY BOARDS:

Journal of Hazardous Materials - Editorial Board
Journal of Environmental Sciences and Health - Associate Editor

U.S. EPA Center for Clean Industrial and Treatment Technologies - Michigan
 Technological University - Science Advisory Board, 1992 - present
 Center for Applied Environmental Technologies, Institute of Advanced Manufacturing Sciences, Inc. -
 Steering Committee, 1991 - present
 WARZYN Engineering, Inc. - Technical Advisory Board, 1990 - present

MUNICIPAL ORGANIZATIONS:

Planning Board, Town of Lee, NH
 Member, 1975 - 1980
 Chairman, 1978 - 1980

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Consultant, 1980 - 1986

Zoning Board of Adjustment, Town of Lee, NH
Member, 1980 - 1986

Durham - UNH Sewer Policy Board
Member, 1979 - Present

Cincinnati, Metropolitan Sanitary District
Appellate Board, 1991 - Present

Planning Advisory Committee, Anderson Township, OH
Member, 1991 - Present

STATE BOARDS:

Ohio Governor's Task Force on Waste Minimization, 1988 - 1991

New Hampshire Solid Waste Management Council
Council Member, 1981 - 1987

State of Ohio Fernald Cleanup Initiative Leadership Team, 1991 - 1992

FUNDED RESEARCH:

1. Aerobic Digestion of Sludge Under Cold Temperature Conditions - Office of Water Resources Research, U.S. Dept of the Interior, \$52,000, 1973 - 1976.
2. Strafford Region Solid Waste Management System - Strafford Regional Planning Commission, \$24,000, 1974 - 1976.
3. Removal of Fluoride from Water by Use of Fluidized Activated Alumina Adsorption - Center for Industrial and Institutional Development, \$9,000, 1975.
4. Water Pollution Potential of Snow Removal Operations - Town of Durham, NH, \$11,000, 1976 - 1977.
5. Water Quality Modeling in the Great Bay Estuary System - Office of Sea Grant, National Oceanic and Atmospheric Administration, \$78,000, 1978.
6. Dispersive Processes for Short Duration Discharges in the Great Bay Estuary System - Office of Sea Grant, National Oceanic and Atmospheric Administration, \$82,000, 1979.
7. Treatment of High Salinity Wastewater with Rotating Biological Contractors - Hubbard Fund, \$15,000, 1978 - 1979.
8. Environmental Engineering in the Oceans - National Science Foundation, \$92,000, 1979 - 1981.
9. Subsurface Disposal System Rejuvenation using Hydrogen Peroxide - Community Services Administration, \$11,000, 1979 - 1981.
10. Pathogen Survival During Forced Aeration Composting of Municipal Sludge - Office of Water Research and Technology, U.S. Dept. of the Interior, \$135,000, 1979 - 1982.

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11. Tertiary Treatment of Municipal Wastewaters Using Seaweeds - Hubbard Fund, \$9,000, 1981 - 1982.
12. The Role of Protozoans in Rotating Biological Contactor Biofilms - National Science Foundation, \$6,000, 1981 - 1982.
13. High Energy Electron Disinfection of Municipal Wastewater Sludge Compost - High Voltage Engineering Corporation, \$2,600, 1981 - 1982.
14. Examination of a Combined Secondary and Tertiary Wastewater Treatment Process for Temperate Regions Using Aquatic Macrophytes and Their Epifloral Biofilms - National Science Foundation, \$343,000, 1982 - 1985.
15. Removal of Heavy Metals by Aquatic Macrophytes in Temperate Regions - National Science Foundation, \$11,000, 1983 - 1984.
16. Evaluation of the Potential for Marine Disposal of Solidified/ Stabilized Inorganic Hazardous Wastes - National Oceanic and Atmospheric Administration, \$80,000, 1983 - 1985.
17. Development of a Dynamic Leaching Test for Hazardous Wastes - New Hampshire Bureau of Hazardous Waste Management, \$24,000, 1984 - 1985.
18. Radon Removal Techniques for Community Public Water Supplies in New Hampshire - U.S. Environmental Protection Agency, \$90,000, 1985 - 1987.
19. Development of a Standard Solid Waste Leaching Test - New Hampshire Office of Waste Management, \$33,000, 1985 - 1987.
20. Development Studies for an Automated Water Filter System - Teledyne Water Pik, \$38,000, 1986 - 1987.
21. Removal of Trace Organics from Municipal Wastewater - Danish Council of Technical and Scientific Research, \$110,000, 1986 - 1987.
22. Biodegradation of Azo Dyes - Ohio Board of Regents, \$90,000, 1988 - 1990.
23. Aerobic Digestion of Recalcitrant Toxics - U.S. EPA, \$72,000, 1988 - 1990.
24. Two-sludge Anaerobic/Aerobic Treatment of CERCLA Leachants in POTWs - U.S. EPA, \$410,000, 1988 - 1990.
25. Biofilm Treatment of Xenobiotics - National Institute of Environmental Health Sciences, \$415,000, 1988 - 1992.
26. Alternative Leaching Scenarios for Solidified/Stabilized Hazardous Wastes - U.S. EPA, \$87,000, 1988 - 1989.
27. Assessment of Solidification/Stabilization for Superfund Contaminated Soils - U.S. EPA, \$133,000, 1988 - 1989.
28. Chemical Fixation of Flue Gas Desulfurization Sludges - Ohio Coal Development Office, \$250,000, 1989 - 1991.
29. Biodegradation of Hazardous Compounds in Rotating Biofilms (Co-PI) - U.S. EPA, \$87,000, 1989.
30. PEI Research Subcontract - PEI, Inc. (later IT Corporation), \$2,756,000, 1989 - 1994.

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31. Assessment of Long Term Durability of Solidified/Stabilized Hazardous Waste Forms U.S. EPA, \$525,000, 1990 - 1993.
32. Microscale Environmental Conditions Present During Biodegradation of Toxic Organics in Biofilms - Ohio Hazardous Substance Research, Education and Management Institute, \$32,000, 1990 - 1992.
33. Stabilization/Solidification Technology Evaluation - E.I. DuPont deNemours and Co., Inc., \$205,000, 1990 - 1992.
34. Assessment of Solidification/Stabilization of Mixed Wastes (co-P.I.) - Westinghouse Materials Company of Ohio, \$560,000, 1990 - 1992.
35. Composting of Municipal Solid Wastes - City of Cincinnati, Ohio, \$150,000, 1990 -1992.
36. Review and Analysis of Environmental Training Plans - Westinghouse Materials Company of Ohio, \$43,000, 1991.
37. Review and Analysis of RCRA Compliance Refresher Course and Student Testing Material - Westinghouse Environmental Management Company of Ohio, \$23,000, 1991-1992.
38. Construction of a Hazardous Waste Research Facility - Ohio Board of Regents, \$2,406,000, 1991.
39. Transport and Microbial Degradation in Biofilms - National Institute of Environmental Health Sciences, \$880,000, 1992-1995.
40. Review of Operable Unit 2 Draft Remedial Investigation Baseline Risk Assessments - Westinghouse Environmental Management Company of Ohio, \$21,000, 1992.
41. Development of Industrial Workshops - Westinghouse Environmental Management Company of Ohio, \$82,000, 1992-1993.
42. UC/USEPA Cooperative Agreement - U.S. EPA, \$900,000, 1993.
43. Microbial Detoxification/Degradation of Hazardous Wastes (co-P.I.) - National Institutes of Health, \$149,000, 1993-1995.
44. Investigation of Nitrification Tower Upsets at the North Regional Wastewater Treatment Plant - Miami Conservancy District, Dayton, OH, \$95,900, 1994-1996.
45. Volatile Organic Carbon Sources and Control at Metropolitan Sewer District Wastewater Treatment Plants - Metropolitan Sewer District of Greater Cincinnati, \$156,000, 1994-1996.

AWARDS:

ASTM Faculty Fellow, 1984

Diplomate - American Academy of Environmental Engineers, 1985 - present

Listed in: Marquis Who's Who in the East

Marquis Moving Up in America

Marquis Who's Who of Emerging Leaders in America

Marquis Who's Who in American Education

Marquis Who's Who in the World

Dictionary of International Biography

American Men and Women of Science

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PATENTS:

Method and Apparatus for Reducing Levels of Organics in Liquids, Patent No. 4,534,865

Sorption/Anaerobic Stabilization for Control of Organic Pollutants in Wastewater, Patent Pending.

Aerobic Fluidized Bed Reactor with Internal Media Cleaning, Patent Pending.

BOOKS:

Bishop, P., Marine Pollution and Its Control, McGraw-Hill Book Co., New York, 357 pp., 1983.

Colombo, P., Barth, E., Bishop, P., Buelt, J. and Conner, J., Innovative Site Remediation Technology: Stabilization/Solidification, American Academy of Environmental Engineers, Annapolis, MD, 166 pp., 1994.

BOOK CHAPTERS:

Bishop, P. and Kinner, N., "Aerobic Fixed - Film Processes", Chapter 3, Biotechnology, Verlag Chemie, Weinheim, Germany, 114-176, 1986.

Bishop, P., Watts, R. and Robson, M., "Chemical Treatment of Hazardous Wastes," Chapter 7, Hazardous Waste Treatment Processes, MOP FD-18, Water Pollution Control Federation, Washington, D.C., 1990.

REFEREED JOURNALS:

Bishop, P.L., "Removal of Powdered Activated Carbon from Water by Foam Separation", Separation Science and Technology, 13:47-58, 1978.

Bishop, P.L. and Sansoucy, G., "Fluoride Removal from Drinking Water by Fluidized Activated Alumina Adsorption", Journal American Water Works Association, 70:554-559, 1978.

Bishop, P.L. and Farmer, M., "The Fate of Nutrients During Aerobic Digestion", Journal of the Environmental Engineering Division, ASCE, 104:967-977, 1978.

Pierstorff, B. and Bishop, P., "Water Pollution from Snow Removal Operations", Journal of the Environmental Engineering Division, ASCE, 106:377-388, 1980.

Bishop, P., Howard, E., Flinkstrom, M., White, C. and Cooke, R., "Regional Resource Recovery Center Cost Analysis", Journal of the Environmental Engineering Division, ASCE, 106:977-990, 1980.

Bishop, P. and Logsdon, S., "Rejuvenation of Failed Soil Absorption Systems", Journal of the Environmental Engineering Division, American Society of Civil Engineers, 107:47-55, 1981.

Kinner, N. and Bishop, P., "Treatment of Saline Domestic Wastewater Using RBCs", Journal of the Environmental Engineering Division, ASCE, 108:650-664, 1982.

Andrews, T. and Bishop, P., "The Use of Hydrogen Peroxide for Failed Soil Absorption System Rehabilitation", Journal of the New England Water Pollution Control Association, 16(10):32-50, 1982.

Bishop, P. and Logsdon, S., "Rejuvenation of Failed Soil Absorption Systems - Closure", Journal of the

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Environmental Engineering Division, ASCE, 108:1387, 1982.

Bishop, P., "The Scale-Up and Limitation of Physical Oxygen Transfer in Rotating Biological Contactors - A Discussion", Water Science and Technology, Volume 14, Pergamon Press, presented at the 11th International Association on Water Pollution Research Conference, Cape Town, South Africa, 14(8):982-984, 1982.

Kinner, N., Balkwill, D. and Bishop, P., "A Light and Electron Microscopical Investigation of Microorganisms Growing in Rotating Biological Contactor Biofilms", Applied and Environmental Microbiology, 45:1659-1669, 1983.

Kinner, N. and Bishop, P., "Treatment of Saline Domestic Wastewater Using RBCs-Closure", Journal of Environmental Engineering, 190(4):984, 1983.

Eighmy, T., Maratea, D. and Bishop, P., "An Electron Microscopic Examination of Wastewater Biofilm Formation and Structural Components", Applied and Environmental Microbiology, 45:1921-1931, 1983.

Bishop, P. and Godfrey, C., "Nitrogen Transformations During Aerobic Composting of Sewage Sludge", Biocycle. Journal of Waste Recycling, 24(4):34-39, 1983.

Manoliadis, O. and Bishop, P., "Temperature Effects on the Rheology of Sludges", Journal of Environmental Engineering, 110(1):110-114, 1984.

Kinner, N., Maratea, D. and Bishop, P., "An Evaluation of the Bacteria and Protozoa Inhibiting Rotating Biological Contractor Biofilms", Water, Science and Technology, Pergamon Press, 1984.

Eighmy, T. and Bishop, P., "Multiplicity of Aspartate Transport in Thin Wastewater Biofilms", Applied and Environmental Microbiology, 48:1151-1158, 1984.

Eighmy, T. and Bishop, P., "Effect of Reactor Turbulence on the Binding Protein-Mediated Aspartate Transport System in Thin Wastewater Biofilms", Applied and Environmental Microbiology, 50(1):120-124, 1985.

Kinner, N., Maratea, D. and Bishop, P., "An Electron Microscope Evaluation of the Bacteria Inhibiting Rotating Biological Contractor Biofilms During Various Loading Conditions", Environmental Technology Letters, 6:455-466, 1985.

Shively, W., Bishop, P., Brown, T. and Gress, D., "Leaching Tests of Heavy Metals Solidified and Stabilized with Portland Cement", Journal Water Pollution Control Federation, 58:234-241, 1986.

Ossenbruggen, P., Constantine, K., Collins, M. and Bishop, P., "Towards Optimum Control of the Activated Sludge Process with Reliability Analysis", Civil Engineering Systems, 4(2):77-86, 1987.

Campbell, K., El-Korchi, T., Gress, D. and Bishop, P., "Stabilization of Cadmium and Lead in Portland Cement Paste Using a Synthetic Seawater Leachant", Environmental Progress, 6:99-103, 1987.

Eighmy, T. and P. Bishop, "Autotrophic Nitrification and Its Role in Nitrogen Removal in Elodea Nuttallii - Based Aquatic Treatment Systems", Water Supply, 6:119-124, 1988.

Bishop, P., "Leaching of Inorganic Hazardous Constituents From Stabilized/Solidified Hazardous Wastes", Hazardous Waste and Hazardous Materials, 5:129-143, 1988.

Bishop, P., and T. Eighmy, "Aquatic Wastewater Treatment Using *Elodea nuttallii*", Journal Water Pollution Control Federation, 61:641-648, 1989.

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- Bishop, P., "Academy Volunteers in Education - Editorial", The Diplomat, 25(3):6, 1989.
- Eighmy, T. and P. Bishop, "Distribution and Role of Bacterial Nitrifying Populations in Aquatic Treatment Systems," Water Research, 23:947-955, 1989.
- Cheng, K. and P. Bishop, "Developing a Kinetic Leaching Model for Solidified/Stabilized Hazardous Wastes," Journal of Hazardous Materials, 24:213-224, 1990.
- Dusing, D., P. Bishop and T. Keener, "Effect of REDOX Potential on Leaching from Stabilized/Solidified Waste Materials," Journal of the Air and Waste Management Association, 42:56-62, 1992.
- Cheng, K. and P. Bishop, "Leaching Boundary Movement in Solidified/Stabilized Waste Forms," Journal of the Air and Waste Management Association, 42:164-168, 1992.
- Cheng, K., P. Bishop and J. Isenburg, "Leaching Boundary in Cement-Based Waste Forms," Journal of Hazardous Materials, 30:285-295, 1992.
- Bishop, Paul, Runzhi Gong and Tim Keener, "Effects of Leaching on Pore Size Distribution of Solidified/Stabilized Wastes," Journal of Hazardous Materials, 31:59-74, 1992.
- Cheng, K. and P. Bishop, "Metals Distribution in Solidified/Stabilized Waste Forms After Leaching," Hazardous Wastes and Hazardous Materials, 9:163-171, 1992.
- Cheng, Kuang Ye and Paul Bishop, "Adsorption, Important in Stabilized/ Solidified Waste Forms," Hazardous Waste and Hazardous Materials, 9:289-296, 1992.
- Harmer, C. and P. Bishop, "Transformation of Azo Dye AO-7 by Wastewater Biofilms," Water, Science and Technology, 26(3-4): 627-636, 1992.
- Safferman, Steven, Sandrine Baud-Grasset, Kim Brackett, Patrick Clark and Paul Bishop, "A Systematic Scanning Electron Microscopy Technique for Evaluating Combined Biological/Granular Activated Carbon Treatment Processes," Journal of Environmental Science and Health, A28: 2239-2262, 1993.
- He, Yongjie and Paul Bishop, "The Effect of Acid Orange 7 on the Nitrification Process," Journal of Environmental Engineering, 120: 108-121, 1994.
- Seshadri, Sanjay, Bishop, Paul and Mourad Agha, Amjad, "Anaerobic/Aerobic Treatment of Selected Azo Dyes in Wastewater," Waste Management, 14: 127-137, 1994.
- Zhang, T. and Bishop, P., "Density, Porosity and Pore Structure of Biofilms," Water Research, 28:2267-2277, 1994.
- Zhang, T. and Bishop, P., "Evaluation of Tortuosity Factors and Effective Diffusivities in Biofilms," Water Research, 28: 2279-2287, 1994.
- Fu, Yun-Chang, Hongshen Jiang and Paul Bishop, "An Inhibition Study of the Effect of Azo Dyes on Bioactivity of Biofilms," Water Science and Technology, 29(7): 365-372, 1994.
- Zhang, Tian and Paul Bishop, "Structure, Activity and Composition of Biofilms," Water Science and Technology, 29(7): 335-344, 1994.
- Bishop, Paul, Zhang, Tian and Fu, Yun-Chang, "Effect of Biofilm Structure, Microbial Distributions and Mass Transport on Biodegradation Processes," Water Science and Technology, 31: (Accepted).

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Ma, YiLong, Ahmed Galal, Hans Zimmer, Harry Mark, Zai Huang and Paul Bishop, "Potentiometric Selective Determination of Hydrogen Sulfide by an Electropolymerized Membrane Electrode Based on Binaphthyl-20-Crown-6", Analytica Chimica Acta (Accepted).

Kupferle, M., T. Chen, V. Gallardo, D. Lindberg, S. Safferman, D. Bishop and P. Bishop, "Anaerobic/Aerobic Treatment of Hazardous Waste Leachates in Publicly-Owned Treatment Works: An Innovative Approach," Water Environment Research (Accepted).

Zhang, Tian, Yun Fu and Paul Bishop, "Competition in Biofilms," Water Science and Technology, 29(11-12): (Accepted).

Jiang, Henry and Paul Bishop, "Aerobic Biodegradation of Azo Dyes in Biofilms," Water Science and Technology, 29(11-12): (Accepted).

Fu, Yun-Chang, Tian Zhang and Paul Bishop, "Determination of Diffusivity of Oxygen in Biofilms Grown in a Completely Mixed Biodrum Reactor," Water Science and Technology, 29(11-12): (Accepted).

Fu, Yun-Chang and Paul Bishop, "The Evaluation of Respiration Rate in Fixed-Film Systems Under Various Organic Loading Rates," Water Environment Research (Accepted).

Galal, A., Wang, Z., Karagözler, A., Zimmer, H., Mark, H. and Bishop, P., "A Potentiometric Iodide (and Other) Ion Sensor Based on a Conducting Polymer Film Electrode. II - Effect of Electrode Conditioning and Regeneration Techniques," Analytica Chimica Acta (Accepted).

Baker, Peter and Paul Bishop, "Prediction of Metals Leaching Rates from Actual S/S Wastes Using the Shrinking Unreacted Core Leaching Procedure," Journal of Hazardous Materials (Accepted).

Zhang, Tian, Yun-Cheng Fu and Paul Bishop, "Competition for Substrate and Space in Biofilms," Water Environment Research (Accepted).

Zhang, T., Fu, Y., Bishop, P., Kupferle, M., Fitzgerald, S., Jiang, H. and Harmer, C., "Transport and Biodegradation of Toxic Organics in Biofilms," Journal of Hazardous Materials (Accepted).

Ma, YiLong, Ahmad Galal, Suzanne Lunsford, Hans Zimmer, Harry Mark, Zai Huang and Paul Bishop, "Poly(Binaphthyl-20-Crown-6) as Receptor Based Molecular Selective Potentiometric Electrodes for Catecholamines and 1,2-Dihydroxybenzene Derivatives," Biosensors & Biotechnology (Submitted).

You, Guangrong, Gregory Sayles, Margaret Kupferle and Paul Bishop, "Anaerobic Aqueous DDT Biodegradation by a Mixed Consortia and Enhancement by Surfactant Addition," Applied and Environmental Microbiology (Submitted).

Safferman, Steven and Bishop, Paul, "An Aerobic Fluidized Bed Reactor with Internal Media Cleaning," Journal of Environmental Engineering (Submitted).

Safferman, Steven and Bishop, Paul, "Intermittent Operation of an Aerobic Fluidized Bed Reactor with Internal Media Cleaning," Journal of Environmental Engineering (Submitted).

Fitzgerald, Sean and Bishop, Paul, "Two Stage Anaerobic/Aerobic Treatment of Sulfonated Azo Dyes," Journal of Environmental Engineering (Submitted).

REFEREED PROCEEDINGS AND BOOKS:

Brown, T. and Bishop, P., "Alkalinity Releases and the Leaching of Heavy Metals from Stabilized/Solidified

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Wastes", Abstracts, 5th International Conference on Chemistry for Protection of the Environment, Leuven, Belgium, 159-161, 1985.

El-Korchi, T., Melchinger, K., Kolvites, B., Gress, D. and Bishop, P., "The Effect of Heavy Metals and Organic Solvents on the Microstructure of Cement Stabilized Hazardous Wastes", Proceedings, Eighth International Conference on Cement Microscopy, Orlando, FL, 132-143, 1986.

Brown, T., Bishop, P. and Gress, D., "Use of an Upflow Column Leaching Test to Study the Release Patterns of Heavy Metals from Stabilized/ Solidified Heavy Metal Sludges, Hazardous and Industrial Solid Waste Testing", 6th volume, ASTM STP 933, edited by D. Lorenzen et al., ASTM, Philadelphia, PA, 79-92, 1986.

Bishop, P., Brown, T. and Shively, W., "Alkalinity Releases and the Leaching of Heavy Metals from Stabilized/Solidified Wastes", Chemistry for Protection of the Environment 1985, edited by L. Pawlowski, G. Alaerts and W. Lacy, Elsevier Science Publishers, Amsterdam, 217-233, 1986.

Brown, T., Bishop, P. and Gress, D., "Use of Upflow Column Leaching Test to Study the Release Patterns of Heavy Metals from Stabilized/Solidified Heavy Metal Sludges, Hazardous and Industrial Solid Waste Testing and Disposal", Vol. 6, edited by D. Lorenzen, ASTM, Philadelphia, PA, 79-92, 1986.

Eighmy, T. and Bishop, P., "Nitrogen Removal in Aquatic Macrophyte Wastewater Treatment Systems", Proceedings, Specialized Conference on Nitrogen Pollution of Water, Brussels, Belgium, November 24-28, 1987.

Kozak, P. and Bishop, P., "The Effect of Mixing and Aeration on the Productivity of Myriophyllum Heterophyllum Michx. (Water Milfoil) During Aquatic Wastewater Treatment," Aquatic Plants for Water Treatment and Resource Recovery, edited by K. Reddy and W. Smith, Magnolia Publishing Inc., Orlando, FL, 445-452, 1987.

Eighmy, T., L. Jahnke and P. Bishop, "Productivity and Photosynthetic Characteristics of Elodea Nuttallii Grown in Aquatic Treatment Systems", Aquatic Plants for Water Treatment and Resource Recovery, edited by K. Reddy and W. Smith, Magnolia Publishing Inc., Orlando, FL, 453-461, 1987.

El-Korchi, T., D. Gress, K. Baldwin and P. Bishop, "Evaluating the Freeze-Thaw Durability of Portland Cement Stabilized/Solidified Heavy Metal Waste Using Acoustic Measurements, Environmental Aspects of Stabilization and Solidification of Hazardous and Radioactive Wastes, ASTM STP 1033, ASTM, Philadelphia, 184-191, 1989.

Kolvites, B. and P. Bishop, "Column Leach Testing of Phenol and Trichloroethylene Stabilized/Solidified with Portland Cement", Environmental Aspects of Stabilization and Solidification of Hazardous and Radioactive Wastes, ASTM STP 1033, ASTM, Philadelphia, PA, 238-250, 1989.

Bishop, P. "Solidification/Stabilization of Contaminated Soils - An Overview," Contaminated Soil '90, Kluwer Academic Publishers, Dordrecht, The Netherlands, 1265-1274, 1990.

Bishop, P., "Contaminant Leaching from Solidified/Stabilized Wastes - Overview," Emerging Technologies in Hazardous Waste Treatment II, American Chemical Society, 302-315, 1991.

Bishop, P., T. Keener, D. Dusing and R. Gong, "Chemical Fixation of Flue Gas Desulfurization Sludges and Fly Ash," Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, ASTM STP 1123, 103-118, 1992

Bishop, Paul and Zhang, Tian, "Effect of Biofilm Structure, Microbial Distributions and Mass Transport on Biodegradation Processes," Proceedings of the Seminar on Biodegradation of Organic Chemical Pollutants

AR303414

in Biofilm Systems, Copenhagen, Denmark, May 19-24, 1994.

Zhang, Tian and Bishop, Paul, "Experimental Determination of the Dissolved Oxygen Boundary Layer and Mass Transfer Resistance Near the Fluid-Biofilm Interface," Water Quality '94, IAWQ, Budapest, Hungary, 297-306, 1994.

Hinsenveld, Merten and Paul Bishop, "Use of the Shrinking Core/Exposure Model to Describe the Leachability from Cement Stabilized Wastes," Stabilization and Solidification of Hazardous, Radioactive and Mixed Wastes, ASTM STP 1240, ASTM, Philadelphia, 1995(Accepted).

Cheng, Kuang Ye and Paul Bishop, "Morphology and pH Changes in Leached Solidified/Stabilized Wastes," Stabilization and Solidification of Hazardous, Radioactive and Mixed Wastes, ASTM STP 1240, ASTM, Philadelphia, 1995 (Accepted).

Cheng, Kuang Ye and Paul Bishop, "Property Changes of Cement Based Waste Forms During Leaching," Stabilization and Solidification of Hazardous, Radioactive and Mixed Wastes, ASTM STP 1240, ASTM, Philadelphia, 1995 (Accepted).

PROCEEDINGS AND OTHER UNREFEREED PUBLICATIONS:

Bishop, P.L. and Kirsch, E.J., "Biological Generation of Methylmercury in Anaerobic Pond Sediment", Proceedings, 26th Purdue Industrial Waste Conference, 628-638, 1972.

Bishop, P.L. and LePage, L.R., "Aerobic Digestion of Wastewater Sludge Under Low Temperature Conditions," Proceedings, 4th Environmental Engineering and Science Conference, Louisville, KY, 539-556, 1974.

Bishop, P.L. and Boardman, G.D., "Foam Separation of Powered Activated Carbon", Proceedings, 29th Purdue Industrial Waste Conference, 91-99, 1974.

Bishop, P.L., Sansoucy, G., "Fluoride Removal from Drinking Water by Fluidized Activated Alumina Adsorption", Proceedings, American Water Works Assn. 96th Annual Conference, New Orleans, 15-5, 1976.

Bishop, P.L., "Treatment of Fluoride Wastes by Fluidized Activated Alumina Adsorption", Proceedings, Eighth Mid-Atlantic Industrial Waste Conference, Newark, Delaware, 57-68, 1976.

Bishop, P.L., "Physico-Chemical Pretreatment of Wastewater from a Secondary Tannery", Proceedings, 33rd Purdue Industrial Waste Conference, 64-72, 1978.

Olofsson, J.A., Bishop, P.L. and Dickson, R.A., "Physiochemical Treatment of Lithograph Wastewater", Proceedings, 33rd Purdue Industrial Waste Conference, 427-431, 1978.

Bishop, P.L. and Pierstorff, B.W., "Water Pollution from Snow Removal Operations", Proceedings, ASCE National Conference on Environmental Engineering, 36-51, 1978.

Bishop, P. and Morris, L., "Treatment of Wastewater from the Mining and Processing of Diatomaceous Earth", Proceedings, 34th Purdue Industrial Waste Conference, Lafayette, Ind., 569-577, May 1979.

Bishop, P., Flinkstrom, M., Cook, R., Howard, E. and White, C., "Economic and Operational Evaluation of a Regional Resource Recovery Center", Proceedings, ASCE National Conference on Environmental Engineering, San Francisco, 450-459, 1979.

AR303415

Kinner, N. and Bishop, P., "High Salinity Wastewater Treatment Using Rotating Biological Contactors", Proceedings, First National Symposium on Rotating Biological Contactor Technology, Champion, PA, 259-268, 1980.

Flinkstrom, M. and Bishop, P., "The Survival of Pathogens During the Composting of Wastewater Sludge", Proceedings, National Conference on Environmental Engineering, New York, NY, July 1980.

Bishop, P. and Kinner, N., "Rotating Biological Contactor Treatment of Hypersaline Wastes", Proceedings of the 36th Purdue Industrial Waste Conference, Lafayette, Indiana, 644-654, 1981.

Mock, F., Olofsson, J. and Bishop, P., "Enhancement of Chromium Mobility in Landfill Receiving Tannery Sludge", Proceedings, 1981 Mid-Atlantic Industrial Waste Conference, Newark, Delaware, 1981.

Mock, F., Olofsson, J. and Bishop, P., "Chromium Stability in Landfill Environments": Solubility Considerations", Proceedings, Fourth Annual Madison Conference on Applied Research and Practice on Municipal and Industrial Wastes, Madison, Wisconsin, 266-277, 1981.

Bishop, P. and Kinner, N., "The Effect of High Salinity on RBC Treatment Efficiency", 1981 American Institute of Chemical Engineers Annual Meeting, Reprint Paper No. 145d, New Orleans, Louisiana, 1981.

Kinner, N., Balkwill, D. and Bishop, P., "The Microbiology of Rotating Biological Contractor Biofilms", Proceedings of the First International Conference on Fixed - Film Biological Processes, King's Island, Ohio, 184-209, 1982.

Bishop, P., Gress, D. and Olofsson, J., "Cement Stabilization of Heavy Metals: Leaching Rate Assessment", Industrial Wastes, Proceedings of the 14th Mid-Atlantic Industrial Waste Conference, College Park, Maryland, 459-467, 1982.

Bishop, P. and Gress, D., "Leaching from Stabilized/Solidified Hazardous Wastes", Proceedings, 1982 National Conference on Environmental Engineering, Minneapolis, MN, 423-429, 1982.

Bishop, P., "Biological Nitrification and Denitrification - A Review", Developments at the Tenth International Conference on Water Pollution Research, U.S. Environmental Protection Agency, 142-151, 1982.

Bishop, P., "The Scale-Up and Limitation of Physical Oxygen Transfer in Rotating Biological Contactors - A Discussion", Proceedings of the 11th International Association on Water Pollution Research Conference, Cape Town, South Africa, 14(8):982-984, 1982.

Kinner, N. and Bishop, P., "An Evaluation of the Bacteria and Protozoa Inhabiting Rotating Biological Contactor Biofilms", Proceedings, International Seminar on Rotating Biological Discs, European Water Pollution Control Association, Stuttgart, West Germany, 91-107, 1983.

Bishop, P. and Breton, R., "Electrolytic Recovery of Copper from Chelated Waste Streams", Toxic and Hazardous Wastes, Proceedings of the 15th Mid-Atlantic Industrial Waste Conference, Lewisburg, PA, 584-596, 1983.

Bishop, P., Ransom, S. and Gress, D., "Fixation Mechanisms in Solidification/Stabilization of Inorganic Hazardous Wastes", Proceedings of the 38th Purdue Industrial Waste Conference, West Lafayette, IN, 395-401, 1983.

Bishop, P. and Breton, R., "Treatment of Electroless Copper Plating Wastes", Proceedings of the 38th Purdue International Waste Conference, West Lafayette, IN, 473-480, 1983.

AR303416

Eighmy, T., Maratea, D. and Bishop, P., "Wastewater Biofilms" Their Formation and Ultrastructural Characteristics", Environmental Engineering, Proceedings of the 1983 National Conference on Environmental Engineering, Boulder, CO, 247-254, 1983.

Bishop, P., Chesbro, W. and Zamarchi, G., "Pathogen Survival During Static Pile Composting of Municipal Wastewater Sludge", Environmental Engineering, Proceedings of the 1983 National Conference on Environmental Engineering, Boulder, CO, 381-390, 1983.

White, M. and Bishop, P., "Evaluation of Five Species of Temperate Climate Aquatic Plants for Application in Aquaculture Treatment of Wastewater", Environmental Engineering, Proceedings of the 1984 National Environmental Engineering Conference, Los Angeles, CA, 564-572, 1984.

Eighmy, T. and Bishop, P., "Substrate Transport Systems in Thin Wastewater Biofilms", Proceedings, Second International Conference on Fixed-Film Biological Processes, Washington, D.C., July 10-12, 1984.

Eighmy, T., and Bishop, P., "Preliminary Evaluation of Submerged Aquatic Macrophytes in a Pilot-Scale Aquatic Treatment System", Environmental Engineering, Proceedings of the 1985 National Conference on Environmental Engineering, Boston, MA, 764-770, 1985.

Brown, T. and Bishop, P., "The Effect of Particle Size on the Leaching of Heavy Metals from Stabilized/Solidified Wastes", Proceedings, International Conference on New Frontiers for Hazardous Waste, Pittsburg, PA, 356-363, 1985.

Bishop, P. and DeWaters, J., "Heavy Metal Removal by Aquatic Macrophytes in a Temperate Climate Aquatic Treatment System", Proceedings: International Conference on Innovative Biological Treatment of Toxic Wastewaters, Arlington, VA, 100-117, 1986.

Bishop, P., " Prediction of Heavy Metal Leaching Rates from Stabilized/ Solidified Hazardous Wastes", Hazardous Wastes, 18th Mid-Atlantic Industrial Waste Conference, Blacksburg, VA, 236-252, 1986.

Bishop, P. and Melchinger, K., "Ocean Disposal of Solidified/Stabilized Hazardous Wastes", Proceedings: Second International Conference on New Frontiers for Hazardous Waste Management, Pittsburgh, PA, EPA/600/9-87/018F, 285-294, 1987.

Bishop, P., E. Arvin and E. Mortensen, "Biodegradation of Phenoxy Acids in Biofilms", Behavior of Organic Micropollutants in Biological Wastewater Treatment, Commission of the European Communities Report Eur 11356, Brussels, 39-64, 1988.

Bishop, P., "Physical and Chemical Pretreatment of Hazardous Wastes", Proceedings, International Conference on Physiochemical and Biological Detoxification of Hazardous Wastes, Technomic Publishing Company, Inc., Lancaster, PA, 35-52, 1988.

Dusing, D., P. Bishop, R. Gong and T. Keener, "Chemical Fixation of Coal Power Plant Wastes," Hazardous and Industrial Materials, Technomic Publishing Co., Lancaster, PA, 385-397, 1991.

Cheng, K.Y., P. Bishop and J. Isenburg, "Cement Stabilization/ Solidification Techniques: pH Profile within Acid-Attacked Waste Form," Waste Materials in Construction, Elsevier Science Publishers B.V., Amsterdam, 371-372, 1991.

Harmer, C., P. Bishop, Y. He, E. Holder and P. Scarpino, "Biofilm Processes for Removal of Azo Dye from Municipal Wastewater," Proceedings of the 46th Purdue Industrial Waste Conference, Lewis Publishers, Inc., Chelsea, MI, 217-228, 1992.

Kupferle, M., T. Chen, V. Gallardo, D. Lindberg, P. Bishop and D. Bishop, "Treatment of Dilute

AR303417

Hazardous Waste Streams by Sorption/Anaerobic Stabilization," Proceedings, Eighteenth Annual Risk Reduction Engineering Laboratory Research Symposium, EPA/600/R-92/028, Cincinnati, OH, 101-109, 1992.

Kirk, D. and P. Bishop, "Assessment of Long-Term Durability of Solidification/Stabilization of Hazardous Wastes," Proceedings, Eighteenth Annual Risk Reduction Engineering Laboratory Research Symposium, EPA/600/R-92/028, Cincinnati, OH, 67-71, 1992.

Bishop, Paul, "President's Corner," Association of Environmental Engineering Professors Newsletter, 26: (2), 1, 1992.

Zhang, Tian, Yun-Cheng Fu and Paul Bishop, "Competition for Substrate and Space in Biofilms," Proceedings of the Water Environment Federation 66th Annual Conference, Anaheim, CA, 349-360, 1993.

Fu, Yun-Chang and Paul Bishop, "The Evaluation of Respiration Rate in Fixed-Film Systems Under Various Organic Loading Rates," Proceedings of the Water Environment Federation 66th Annual Conference, Anaheim, CA, 283-294, 1993.

Fu, Y., Jiang H. and Bishop, P., "An Inhibition Study of the Effect of Azo Dyes on Bioactivity of Biofilms," First International Specialized Conference on Microorganisms in Activated Sludge and Biofilm Processes, Paris, 347-354, 1993.

Zhang, T. and Bishop, P., "Structure, Activity and Composition of Biofilms," First International Specialized Conference on Microorganisms in Activated Sludge and Biofilm Processes, Paris, 303-312, 1993.

Zhang, T., Fu, Y. and Bishop, P., "Competition in Biofilms," First International Specialized Conference on Biofilm Reactors, Paris, 705-712, 1993.

Jiang, H. and Bishop, P., "Aerobic Biodegradation of Azo Dyes in Biofilms," First International Specialized Conference on Biofilm Reactors, Paris, 843-848, 1993.

Fu, Y., Zhang, T. and Bishop, P., "Determination of Diffusivity of Oxygen in Biofilms Grown in a Completely Mixed Biodrum Reactor," First International Specialized Conference on Biofilm Reactors, Paris, 543-550, 1993.

Bishop, Paul, "The Future Role of Stabilization/Solidification Technologies in Landfill," (Invited Lecture), Proceedings of Landfill Tomorrow - Bioreactors or Storage, Imperial College, London, 62-76, 1993.

Bishop, Paul, "President's Corner," Association of Environmental Engineering Professors Newsletter, 27: (2), 1, 1993.

Ma, YiLong, Ahmed Galal, Hans Zimmer, Harry Mark, Zai Huang and Paul Bishop, "Potentiometric Selective Determination of Hydrogen Sulfide by an Electropolymerized Membrane Electrode Based on Binaphthyl-20-Crown-6", Proceedings of the American Chemical Society Meeting, San Diego, CA, March 13-18, 1994.

Ma, YiLong, Ahmad Galal, Hans Zimmer, Harry Mark, Zai Huang and Paul Bishop, "Poly-binaphthyl-20-crown-6 as Receptor Based Molecule Selective Potentiometric Electrodes for Catecholamines and 1,2-Dihydroxybenzene Moieties," Proceedings of the Third World Congress on Biosensors, New Orleans, LA, June 1-3, 1994.

Zhang, T., Fu, Y., Bishop, P., Kupferle, M., Fitzgerald, S., Jiang, H. and Harmer, C., "Transport and Biodegradation of Toxic Organics in Biofilms," Proceedings of the Conference on Hazardous Waste Research, Bozeman, MT, June 8-10, 1994 (in press).

AR303418

Zhang, Tian and Paul Bishop, "Effect of Roughness and Thickness of Biofilms on External Mass Transfer Resistance," Critical Issues in Water and Wastewater Treatment, Proceedings of the 1994 ASCE National Conference on Environmental Engineering, 593-600, 1994.

Galal, A., Mark, H. and Bishop, P., "Conducting Polymers-Based Chemical Sensors," Proceedings, Symposium on Transducer-active Polymers: Active Components in Sensors and Actuators, American Chemical Society, Washington, D.C., August 21-26, 1994.

You, Guanrong, Gregory D. Sayles, Margaret J. Kupferle, Paul L. Bishop and Douglas S. Lipton, "Enhancement of Anaerobic Bioremediation of DDT-Contaminated Soil with Nonionic Surfactants," Emerging Technologies in Hazardous Waste Management VI, American Chemical Society, 658-660, 1994.

Zhang, Tian and Paul Bishop, "Evaluation of Substrate and pH Effects in a Nitrifying Biofilm," Proceedings of the Water Environment Federation 67th Annual Conference, 519-530, 1994.

You, Guanrong, Gregory D. Sayles, Margaret J. Kupferle, Paul L. Bishop and Douglas S. Lipton, "Anaerobic DDT Biodegradation of Contaminated Soil by Mixed Consortia and Enhancement by Surfactant Addition in Slurry Reactors," Proceedings of the Water Environment Federation 67th Annual Conference, 635-646, 1994.

Yu, Tong, Paul L. Bishop, Harry B. Mark and Ahmed Galal, "Novel Electrochemical Microsensor for Sulfide Determination in Environmental Biofilms," Pittcon '95, 46th Pittsburgh Conference & Exposition, New Orleans, LA, March 5-10, 1995 (Submitted).

UNPUBLISHED PRESENTATIONS:

Bishop, P. and Kinner, N., "Treatment of a High Salinity Wastewater by Use of Rotating Biological Contactors", presented at the American Society of Civil Engineers Annual Convention, Atlanta, GA, October 1979.

Kinner, N. and Bishop, P., "Microbiology of Rotating Biological Contactors Treating High Salinity Wastewater", presented at Water Industry '81 International Conference, Brighton, England, 1981.

Andrews, T. and Bishop, P., "The Use of Hydrogen Peroxide for Failed Soil Absorption System Rehabilitation", presented at New England Water Pollution Control Association Annual Meeting, Whitefield, New Hampshire, October 1981.

Kinner, N. and Bishop, P., "The Microbiology of Rotating Biological Contactor Biofilms", presented at the New England Water Pollution Control Association Annual Meeting, Hyannis, MA, 1982.

Bishop, P., "Marine Disposal of Solidified/Stabilized Inorganic Hazardous Wastes", Marine Pollution Conference, Durham, NH, September 1983.

White, M. and Bishop, P., "Temperate Climate Aquaculture Wastewater Treatment", BioEnergy 84 World Conference, Gothenburg, Sweden, June 18-21, 1984.

Bishop, P., "Nitrogen Transformations During Sludge Composting", 1984 New England Workshop on Composting and Land Application, Boston, MA, March 28-30, 1984.

Shively, W., Brown, T., Bishop, P. and Gress, D., "Heavy Metal Binding Mechanisms in the Stabilization/Solidification Hazardous Waste Treatment Process", presented at the 57th Annual Conference of the Water Pollution Control Federation, New Orleans, LA, Sept. 30-Oct. 4, 1984.

AR303419

Brown, T., Shively, W., Bishop, P. and Gress, D., "Use of an Upflow Column Leaching Test to Study the Release Patterns of Heavy Metals for Stabilized/Solidified Heavy Metal Sludges", International Symposium on Industrial and Hazardous Waste, Alexandria, Egypt, June 24-27, 1985.

Bishop, P., "Prediction of Long-Term Leaching Rates from Stabilized/ Solidified Hazardous Wastes", presented at the Alberta Environmental Centre, Vegreville, Alberta, Canada, 47 pp., March 17, 1986.

Bishop, P., "Hazardous Waste Management Seminar", UNH Nashua Graduate Center, Nashua, NH, 136 pp., April 15, 1986.

Melchinger, K., Bishop, P. and Gress, D., "Marine Disposal of Solidified/Stabilized Hazardous Wastes", Sixth International Ocean Disposal Symposium, Pacific Grove, CA, 18 pp., April 21-25, 1986.

Eighmy, T., Jahnke, L. and Bishop, P., " The Use of Elodea nuttallii in a Combined Secondary and Tertiary Aquatic Wastewater Treatment System", Conference on Research and Applications of Aquatic Plants for Water Treatment and Resource Recovery, Orlando, FL, July 20-24, 1986.

Kozak, P. and Bishop, P., " The Effect of Mixing and Aeration on the Productivity of Myriophyllum heterophyllum Michx. (Water Milfoil) During Aquatic Wastewater Treatment", Conference on Research and Applications of Aquatic Plants for Water Treatment and Resource Recovery, Orlando, FL, July 20-24, 1986.

Bishop, P., "Removal of Trace Organics from Municipal Wastewater", Danish Council of Technical and Scientific Research, Copenhagen, Denmark, 45 pp., October 1986.

Bishop, P., "Fate of Micropollutants in Wastewater Treatment", presented to the Laboratoriet for Teknisk Hygiejne, Dansk Tekniske Højskole, Lyngby, Denmark, November 12, 1986.

Bishop, P., "Biological Treatment of Micropollutants: Case Study", presented to Hygiejneteknisk Faggruppe (Danish Society of Civil Engineers), Copenhagen, Denmark, 21 pp., December 2, 1986.

Bishop, P., "Statistisk Forsøgsplægning og Bearbejdelse", presented to the Groundwater and Soil Pollution Research Group, Dansk Tekniske Højskole, Lyngby, Denmark, January 1987.

Bishop, P., "Solidification/Stabilization of Hazardous Wastes", Seminarraekke om Kemikalieaffald og Slamkompostering, Lyngby, Denmark, 44 pp., March 1987.

Bishop, P., "Leaching Tests for Solid and Hazardous Wastes", Seminarraekke om Kemikalieaffald og Slamkompostering, Lyngby, Denmark, 37 pp. March 1987.

Bishop, P., "Composting of Municipal Wastewater Sludges", Seminarraekke om Kemikalieaffald og Slamkompostering, Lyngby, Denmark, 53 pp., March 1987.

Bishop, P., Arvin, E. and Mortensen, E., "Treatability of Chlorophenoxy Acids", presented at the Workshop on Behavior of Organic Micropollutants in Biological Wastewater Treatment, Copenhagen, Denmark, May 18-19, 1987.

Kolvites, B. and Bishop, P., "Column Leach Testing of Phenol and Trichloroethylene Stabilized/Solidified with Portland Cement", 4th International Symposium on Environmental Aspects of Stabilization/Solidification of Hazardous and Radioactive Wastes, Atlanta, GA, 34 pp., May 1987.

El-Korchi, T., Gress, D., Baldwin, K. and Bishop, P., "Evaluating the Freeze-Thaw Durability of Portland Cement Stabilized/Solidified Hazardous Waste Using Acoustic Measurements", Fourth International Hazardous Waste Symposium on Environmental Aspects of Stabilization/Solidification of Hazardous and Radioactive Wastes", Atlanta, GA, May 1987.

AR303420

Bishop, P. and Melchinger, K., "Ocean Disposal of Solidified/Stabilized Hazardous Wastes", presented at the 60th Annual Water Pollution Control Federation Conference, Philadelphia, PA, October 4-7, 1987.

Bishop, P. and Eighmy, T., "Aquatic Wastewater Treatment in Cold Climates", presented at the 60th Annual Water Pollution Control Federation Conference, Philadelphia, PA, October 4-7, 1987.

Kozak, P. and P. Bishop, "Evaluation of Submerged, Temperate Plant Species for Wastewater Treatment, "61st Annual Water Pollution Control Federation Conference, Dallas, TX, October 1988.

Bishop, P., "Particle Size and Leaching Test Procedures," 197th American Chemical Society National Meeting, Dallas, April 9-14, 1989.

Bishop, P., "Wastewater Treatment Using Biofilms," presented at Tsinghua University, Beijing, PRC, May 15, 1989.

Bishop, P., "Solidification/Stabilization of Hazardous Wastes," presented at Tsinghua University, Beijing, PRC, May 18, 1989.

Bishop, P., "The Leaching Characteristics of Solidified/Stabilized Hazardous Wastes," presented at the Vanderbilt University Seminar Series, Nashville, TN, December 4, 1989.

Kupferle, M., P. Bishop and D. Bishop, "Treatment of CERCLA leachates in POTWs: Anaerobic/Aerobic Sequential Treatment," U.S. EPA Symposium on Bioremediation of Hazardous Wastes, Arlington, VA, February 13-15, 1990.

Cheng, K. and P. Bishop, "Developing a Kinetic Leaching Model for Solidified/Stabilized Hazardous Wastes," Second Annual GCHSRC Symposium on Solidification/Stabilization: Mechanisms and Applications, Beaumont, TX, February 15-16, 1990.

Bishop, P., P. Scarpino, C. Harmer and R. Dosani, "Biodegradation of Azo Dyes in Biofilms," NIEHS Conference on Biological Hazardous Waste Treatment, Logan, UT, April 9-10, 1990.

Bishop, P., "Leaching of Stabilized Materials," presented at the Leachability Workshop and Technical Briefing, U.S. EPA Science Advisory Board, Washington, D.C., May 9, 1990.

Cheng, K. and P. Bishop, "Developing a Kinetic Leaching Model for Solidified/Stabilized Hazardous Wastes," Second International Symposium on Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, Williamsburg, VA, May 29 - June 1, 1990.

Bishop, P., T. Keener and R. Gong, "Chemical Fixation of Flue Gas Desulfurization Sludges and Flyash," Second International Symposium on Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, Williamsburg, VA, May 29 - June 1, 1990.

Kupferle, M., P. Bishop, D. Bishop and S. Safferman, "Anaerobic/Aerobic Sequential Treatment of Hazardous Waste Leachates in a POTW: An Innovative Approach," 63rd Annual Water Pollution Control Federation Conference, Washington, D.C., October 7-11, 1990.

Bishop, P. "Composting Municipal Wastes," presented at the Composting Workshop, Cincinnati, Ohio, March 5-9, 1991.

He, Y., E. Holder, P. Bishop and P. Scarpino, "The Influence of Solids Retention Time and Dye Concentration on Biodegradation of Acid Orange Seven (AO7)", 1991 ASM Annual Meeting, Dallas, TX, May 5-9, 1991.

AR303421

Holder, E., C. Harmer, P. Bishop and P. Scarpino, "The Influence of COD and Dissolved Oxygen on Bacterial Population Dynamics and Biodegradation of Acid Orange Seven (AO7) in Wastewater," 1991 ASM Annual Meeting, Dallas, TX, May 5-9, 1991.

Bishop, D., R. Govind and P. Bishop, "Innovative Biosystems for Control of Toxic Materials in Wastewater Treatment," presented at the Soviet-American Symposium on Development of Wastewater Treatment Methods in Russia, Moscow, USSR, September 16-27, 1991.

Haws, Krista, Chris Harmer, J. Robie Vestal and Paul Bishop, "The Effect of Acid Orange 7 on the Microbial Biofilm of Rotating Biodrums," presented at the Ohio and Allegheny Branches American Society of Microbiology Annual Meeting, Mt. Sterling, OH, October 11, 1991.

Safferman, Steven, Makram Suidan, Margaret Kupferle and Paul Bishop, "Scanning Electron Microscope Monitoring of Biological Granular Activated Carbon Hazardous Waste Treatment Processes," presented at the Eighteenth Annual Risk Reduction Engineering Laboratory Research Symposium, Cincinnati, OH, April 1992.

Holder, E. and P. Bishop, "Characterization and Survey of the Ability to Decolorize Azo Dyes by Bacterial Isolates from Several Bioreactors," presented at the 1992 ASM Annual Meeting, May 1992.

Haws, K. C. Harmer J. Vestal and P. Bishop, "The Effect of Acid Orange Seven (AO7) on the Microbial Biofilm of a Rotating Bioreactor," presented at the 1992 ASM Annual Meeting, May 1992.

Bishop, P.L., "The Art and Science of Stabilization/Solidification," Chemical Waste Management Science and Technology Seminar Series, Tuscaloosa, AL, September 15-16, 1992.

Bishop, P.L., "Biodegradation of Azo Dyes in Biofilms," Conference on Microbial Degradation of Environmental Pollutants: Potentials and Limitations for Practical Use, Bad Honnef, Germany, December 2-4, 1992.

Bishop, P., "Biodegradation of Toxic Organics in Biofilms - An Improved Method for Management of Azo Dyes," 78th U.S. Dye Manufacturers Operating Committee/Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturing (USOC/ETAD) Meeting, Pittsburgh, PA, July 30, 1993.

Hinsenveld, Merten and Paul Bishop, "Use of the Shrinking Core/Exposure Model to Describe the Leachability from Cement Stabilized Wastes," Third International Symposium on Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, Williamsburg, VA, November 1-5, 1993.

Cheng, Kuang Ye and Paul Bishop, "Morphology and pH Changes in Leached Solidified/ Stabilized Wastes," Third International Symposium on Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, Williamsburg, VA, November 1-5, 1993.

Cheng, Kuang Ye and Paul Bishop, "Property Changes of Cement Based Waste Forms During Leaching," Third International Symposium on Stabilization/Solidification of Hazardous, Radioactive and Mixed Wastes, Williamsburg, VA, November 1-5, 1993.

Taylor, D., Breen, A., Loper, J. and Bishop, P., "Characterization of a Biofilm Reactor Using DNA Amplification Fingerprinting," Symposium on Emerging Technologies in Biomedical Engineering, Cincinnati, OH, November 1, 1993.

Bishop, Paul, "Biodegradation of Toxic Industrial Organic Chemicals in Biofilm Treatment Systems," Water and Environment Group of the Society of Chemical Industry, Invited Annual Lecture, London, November 16, 1993.

AR303422

Bishop, Paul, "Fate of Toxic Organics in Biofilms," Invited Lecture, Washington State University, Pullman, WA, February 28, 1994.

Zhang, T., Fu, Y. and Bishop, P., "Influence of Biofilm Structure on Mass Transport in Biofilms Used to Treat Hazardous Wastes," 9th Annual Conference on Hazardous Waste Remediation, Bozeman, MT, June 8-10, 1994.

Zhang, Tian and Paul Bishop, "Effect of Roughness and Thickness of Biofilms on External Mass Transfer Resistance," ASCE National Conference on Environmental Engineering, Boulder, CO, July 11-13, 1994.

Bishop, P., Freeman, H., Baillod, R., Keoglian, G. and Hoag, G., "AEEP Workshop on Pollution Prevention," 67th Annual Water Environment Federation Conference, Chicago, October 16-20, 1994.

Fitzgerald, Sean and Paul Bishop, "Two Stage Anaerobic/Aerobic Treatment of Select Sulfonated Azo Dyes," Poster, 67th Annual Water Environment Federation Conference, Chicago, October 16-20, 1994.

REPORTS, THESES, ETC.:

Bishop, P.L., "Field Study of a Tertiary Lagoon", M.S.C.E. Thesis, Purdue University, 1970.

Bishop, P.L., "Biogenesis of Methylmercury in Anaerobic Pond Sediment", Ph.D. Dissertation, Purdue University, 1972.

Melvin, D.W., Bishop, P.L., Amell, A.R., Stevenson, K.D., "Agency Regulation", Chapter XI, The Impacts of an Oil Refinery Located in Southeastern New Hampshire: A Preliminary Study, University of New Hampshire, 1974.

Henry, W., Bishop, P.L., Hall, F. and Nodine, R., "Strafford Region Solid Waste Management and Resource Recovery Study", Resources Development Center, University of New Hampshire, 213 pp., 1976.

Bishop, P.L., "Aerobic Sludge Digestion Under Low Temperature Conditions", Final Report, Office of Water Research and Technology, U.S. Dept. of the Interior, 115 pp., 1977.

Howard, E., White, C., Cook, R., Flinkstrom, M. and Bishop, P., "Economic and Operational Evaluation of the University of New Hampshire Regional Recycling Center", University of New Hampshire, Durham, NH, 99 pp., 1978.

Bishop, P., "Aerobic Digestion of Wastewater Sludge Under Low Temperature Conditions", Research Report No. 18, Water Resources Research Center, University of New Hampshire, Durham, NH, 115 p., 1978.

Bishop, P. and Chesbro, W., "Pathogen Survival During Forced Aeration Composting of Municipal Sludge", Research Completion Report, Office of Water Research and Technology, U.S. Department of the Interior, 190 pp., 1982.

Bishop, P. and Chesbro, W., "Pathogen Survival During Forced Aeration Composting of Municipal Wastewater Sludge", Water Resources Research Center Research Report No. 37, University of New Hampshire, 159 pages, December 1982.

Bishop, P., "Solid Waste Management Plan", Tri-County Solid Waste Management District, Manchester, NH, 121 pp., 1985.

Bishop, P., "Development of a Dynamic Leaching Test for Stabilized/ Solidified Hazardous Wastes", New

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Hampshire Office of Waste Management, Concord, NH, 144 pp., June 1985.

Bishop, P., "Examination of a Combined Secondary and Tertiary Wastewater Treatment Process for Temperate Regions Using Aquatic Macrophytes and Their Epifloral Biofilms", Completion Report, National Science Foundation, Washington, D.C., 245 pp., November 1985.

Cullinane, M., Bishop, P., Jones, L., Pitt, W. and Tittlebaum, M., "Physical Treatment", Research Needs Workshop: Hazardous Waste Treatment and Disposal, edited by R. Loerner, G. Parkin and W. Pipes, National Science Foundation, 35-42, 1986.

Bishop, P. and Gress, D., "Evaluation of the Potential for Marine Disposal of Solidified/Stabilized Inorganic Hazardous Wastes", Completion Report, Office of Sea Grant, National Oceanic and Atmospheric Administration, 106 pp., 1986.

Bishop, P., "Development of a Standardized Solid Waste Leaching Procedure", Completion Report, New Hampshire Office of Waste Management, Concord, NH, 121 pp., December 1986.

Bishop, P., "Simplified Manual for Use of SAS and SAS/GRAPH", Department of Environmental Engineering, Technical University of Denmark, 132 pp., March 1987.

Sundberg, D., P. Bishop and L. Turner, "Characterization of the Diffusion of Organic Liquids from Dilute Aqueous Solutions into Polymers", Final Report, Teledyne Water Pik, Fort Collins, CO, 46 pp., 1987.

Bishop, Paul and Tim Keener, "Chemical Fixation of Flue Gas Desulfurization Sludges and Fly Ash", Final Report, Ohio Coal Development Office, Columbus, OH, 305 pp., 1992.

Bishop, Paul, Riley Kinman, Margaret Kupferle, Jon Reid and Jeffrey Eberhard, "Composting Municipal Wastes," Final Report, City of Cincinnati Department of Public Works, 128 pp., 1992.

Bishop, P., M. Beljin, P. Biswas, J. Eberhard, L. Eckart, J. Reid and J. Uber, "Review of the Fernald Environmental Management Project Remedial Investigation Baseline Assessment for Operable Unit 2," Final Report, Westinghouse Environmental Management Company of Ohio, 40 pp., 1992.

Hauser, Thomas and Paul Bishop, "Workshop on Transite Decontamination, Dismantle- ment and Recycle/Disposal," Final Report submitted to Office of Environmental Restoration and Waste Management, U.S. Department of Energy, 1993.

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CURRICULUM VITA FOR**DAVID E. DANIEL****College Education**

B.S. University of Texas, 1972 (Civil Engineering)
M.S. University of Texas, 1974 (Civil Engineering)
Ph.D. University of Texas, 1980 (Civil Engineering, Title of Dissertation:
"Moisture Movement in Soils in the Vicinity of Waste Disposal Sites")

Academic Experience

- Assistant Professor, University of Texas, 1981 to 1985
- Associate Professor, University of Texas, 1985 to 1991
- Professor, University of Texas, 1991 to Present
- L.B. (Preach) Meaders Professor of Civil Engineering, University of Texas, 1992 - Present
- Associate Chairman for Academic Affairs, University of Texas, Department of Civil Engineering, 1994 - Present

Research Assignments

Geosynthetic Research Institute, Drexel University, Fall Semester, 1991.

Courses Taught

Undergraduate:	Introduction to Soil Mechanics Foundation Engineering Earth Slopes and Retaining Structures
Graduate:	Seepage and Dams Measurement of Soil Properties Shearing Behavior of Soils Geotechnics of Landfill Design Geotechnics of Waste Site Remediation Consolidation and Settlement of Soils
Continuing Education:	Geotechnical Engrg. for Waste Disposal Projects (1982-1987) Management of Hazardous Wastes, 1987 Clay Liners and Covers for Waste Disposal Facilities (3 to 5 Times per Year Since 1988) Geosynthetic Clay Liners for Waste Containment (Biannually Since 1993) Sanitary Landfill Design, Annually 1989-1991 Groundwater Contamination from Petroleum Hydrocarbons (Annually Since 1990) (See Also Training Workshops)

Engineering Experience

Geotechnical Engineer, Woodward-Clyde Consultants, San Francisco, 1974-1977

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Representative Consulting Experience**Permeability Testing and Assessment:**

- Field Permeability Testing on Natural Clay Liner, Shreveport Louisiana; International Paper Company, 1979.
- Laboratory Permeability Tests on Unsaturated Soils and Rock Cores from Colorado; D'Appolonia Engineers, 1981.
- Laboratory Permeability Tests on Unsaturated Soil Samples from Ohio; Law Engineering and Testing Co., 1982.
- Laboratory Permeability Tests on Unsaturated Soil Samples from Tennessee; Union Carbide, 1983.
- Laboratory Permeability Tests on Soil Samples Permeated with Organic Solvents, Newark, New Jersey; Dames and Moore, 1985.
- Field Permeability Testing on Compacted Clay Cover over Landfill, Niagara Falls, New York; Bechtel National, 1985.
- Permeability Testing of Asphaltic Concrete for Landfill Cover in New England; Reteck, 1987, 1988.
- Permeability Testing of Soil-Bentonite Mixes from California; Trautwein Soil Testing Equipment Co., 1987.
- Permeability Testing of Closure Cap Soils at Oak Ridge, Tennessee; Martin Marietta Energy Systems, 1988.
- Permeability of Vertical Cutoff Wall Near Sacramento; SMW Seiko, 1991.
- Permeability of Geosynthetic Clay Liners; National Seal Company, 1992.
- Permeability Testing of Closure Cap Soils, Martin Marietta Energy Systems, 1992.
- Permeability of Natural Clay Liner at Weldon Springs Remedial Action Project, M-K Ferguson, Weldon Springs, Missouri, 1992-93.

Specialized Testing of Unsaturated Soils:

- Moisture-Suction Relationships for Desiccated Mine Tailings from Wisconsin; Exxon Minerals Co., 1984.
- Moisture-Suction Relationships for Sand/Bentonite Mixture; E.I. Dupont de Nemours Co., 1985.
- Moisture-Suction and Permeability-Suction Relationships for Soil from South Carolina; Interra Corp., 1988.
- Consolidation of Compacted Clay from Hazardous Waste Landfill Cell; Concord Resources Group, 1991.

Ponds and Lagoons:

- Water-Holding Pond, San Marcos, Texas; Butler Manufacturing, 1981.
- Pond for Waste Water from Uranium Mine, Southern Texas; Vinson and Elkins, 1982.
- Pond for Textile Sludge, San Marcos, Texas; West Point Pepperell, 1983.
- Seepage from Clay-Lined Pond at Hazardous Waste Disposal Site, Oklahoma; U.S. Pollution Control, 1984.
- Basin F at Rocky Mountain Arsenal, Denver, Colorado; Rivkin, Radler, Dunn, and Bayh, 1987.
- Liner for Paper Mill Plant Lagoons, Marathon, Ontario, Canada; Geo-Canada, Ltd., 1992.

Municipal Solid Waste Landfills:

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- Review of Application for Proposed Landfill South of Houston, Texas; Mavis Kelsey, 1983.
- Review of Application for Proposed Landfill near Galveston, Texas; Cook-Joyce, 1983-84.
- Review of Application for Proposed Landfill near Crystal Lake, Illinois; Bishop and Callas, 1985.
- Cover for Landfill in Northern New Jersey; Converse Consultants East, 1986.
- Clay Liner for Landfill in Somerset County, Pennsylvania; Chambers Development Corp., 1987.
- Clay Liner for Landfill in Eau Claire, Wisconsin; Ayres Associates, 1987-88.
- Clay Liner for Landfill in Central New Jersey; Budd Lamer, et al., 1988.
- Clay Liner and Soil Cover for Landfill in Edgemont, South Dakota; SDDS, Inc., 1989-1991.
- Proposed Landfill near Toronto, Canada; Geo-Canada Ltd; 1992.
- Keller Canyon Landfill, Contra Costa County, California; Browning-Ferris Industries, 1992.
- Final Covers for Solid Waste Landfills in California; GeoSyntec Consultants and California Water Quality Board, 1992-93.
- Proposed Eagle Mountain Landfill in Southern California, Mine Reclamation Co., Palm Springs, 1992-94.
- Groundwater Pressure Relief System for Trinity Landfill, Laidlaw Environmental Services, Inc., Fort Worth, Texas, 1993.
- Mica Landfill, CH2M Hill, Spokane, Washington, 1993.
- Construction Delays, Mason County Landfill, Michigan, 1993.
- Geosynthetic Clay Liner, Coffin Butte Landfill, EMCON Northwest, Portland, OR, 1994.

Industrial or Hazardous Waste Landfills and Closures:

- Clay Liner for Landfill near Baton Rouge, Louisiana; Browning-Ferris Industries, 1983.
- Vadose Zone Monitoring System at Hazardous Waste Landfill in Pacific Northwest; Woodward-Clyde Consultants, 1984.
- Leakage from Landfill in Western Pennsylvania; Pennsylvania Dept. of Environmental Resources, 1985.
- Clay Liner for Landfill in Western Pennsylvania; Pennsylvania Dept. of Environmental Resources, 1986.
- Clay Liner for Landfill near Last Chance, Colorado; Browning-Ferris Industries, 1988.
- Cover System Design Guidance Manual, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 1990.
- Landfill Issues in Chemical Waste Disposal, Hoechst-Celanese, Corpus Christi, TX, 1990.
- Cover Materials for Hazardous Waste Cells, Texas Gulf Coast, Engineering Science, Austin, Texas, 1991.
- Disposal Unit 1, Highway 36 Landfill, Colorado, Concord Resources, 1991.
- Construction Claim, Hazardous Waste Disposal Cell, Dow Chemical Company and Merit Environmental Services, Baton Rouge, LA, 1991.
- Closure Cap for Hazardous Waste Landfill, Buttonwillow, California; Laidlaw Environmental Services (Lokern), Inc., 1992.
- Groundwater Contamination from Waste Disposal Center, Sinton, Texas; Woodard, Hall & Primm, 1993-94.
- USPCI Shuqualak Mountain Facility, Noxubee County, Mississippi; Mississippi Dept. of Environmental Quality, 1993.
- FTMI Disposal Facility, Brooksville, Mississippi; Mississippi Dept. of Environmental Quality, 1993.
- Industrial Waste Pits, Union Carbide, Texas City, TX, 1994.

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Radioactive Waste Disposal Facilities:

- Review Panel for Hanford's Barrier Program, Richland, Washington; Ebasco, 1992.
- Value Engineering Panel for Hanford Protective Barrier Plan, Westinghouse Hanford Co., 1993.
- Low-Level Radioactive Waste Disposal Facility, Chem-Nuclear Systems, Inc., Barnwell, South Carolina, 1993.
- Asphalt Barrier, Battelle Pacific Northwest Laboratories, Richland, Washington, 1993.
- Surface Barrier, Westinghouse Hanford Co., Richland, Washington, 1993-94.
- Technical Advisor, Buried Waste Integrated Demonstration, EG&G Idaho, 1994.
- Alternative Covers for Mixed Waste Integrated Demonstration, Sandia National Laboratories, 1994.

Site Remediation Projects:

- Leaky Landfill on Texas Gulf Coast; Woodward-Clyde, 1983.
- Cleanup of Uncontrolled Hazardous Waste Dump near Baton Rouge, Louisiana; Taylor, Porter, Brooks and Phillips, 1983.
- Cover System for CAPCA Closure Project, Oak Ridge Y-12 Operations, Oak Ridge, Tenn.; Martin Marietta Energy Systems, 1988.
- Cover System for Lone Pine Landfill, New Jersey; AWD Associates, 1990.
- Clay Liner in Cap for Mixed Waste Management Facility, Savannah River Operations, Aiken, SC; U. S. Dept. of Energy, 1990.
- Closure Systems at DOE's Portsmouth, Ohio, Gaseous Diffusion Plant; Martin-Marietta Energy Systems, Oak Ridge, TN, 1990-1991.
- Alternative Cover System for Stabilized Hazardous Waste Sludge, Texas Gulf Coast; McClelland Engineers (Environmental), Houston, TX, 1990.
- Remediation of Chromium Waste in Baltimore; Soil Safe, Inc., 1991.
- Remediation of Brlo Refining Site, Houston; Woodward, Hall & Primm, 1992.
- Soils for Final Cover Systems at Oak Ridge, Tennessee; Martin Marietta, 1991-92.
- Panel on In Situ Containment Technologies, Univ. of Buffalo and DuPont Chemicals, 1992-93.
- Helen Kramer Superfund Site, New Jersey, U.S. Army Corps of Engineers, 1994.

Cost Allocation for Site Remediation Projects:

- Allocation of Cleanup Costs at Hazardous Waste Dump in Louisiana; Taylor, Porter, Brooks, and Phillips, 1983.
- Rocky Mountain Arsenal, Denver, Colorado; Rivkin, Radler, Dunn, and Bayh, 1987.
- Brlo, Motco, and Other Sites Near Houston; Monsanto, 1993-94.

Deep Wells and Caverns:

- Release of Contaminants from Solution Mine in Salt Dome, Southern Texas; United Resource Recovery, 1988.

Expert Testimony:

- Sult on Allocation of Cleanup Costs at Hazardous Waste Dump in Louisiana; Taylor, Porter, Brooks, and Phillips, 1983.
- Hearing to Revoke License for Hazardous Waste Disposal Facility in Oklahoma; U.S. Pollution Control, Inc., 1984.

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- Hearing to Establish Laws in Texas Concerning Regulation of Hazardous Waste Disposal; Governor's Select Committee on Waste Management, 1984.
- Hearing to Revoke Permit for Hazardous Waste Landfill in Western Pennsylvania; Pennsylvania Dept. of Environmental Resources, 1985.
- Hearing to Establish Regulations on Disposal of Waste in Illinois; Illinois Pollution Control Board, 1985.
- Hearing on Permit Application for Municipal Waste Landfill Near Crystal Lake, Illinois; Bishop and Callas, 1985.
- Hearing to Deny Permit for Hazardous Waste Landfill in Western Pennsylvania; Pennsylvania Dept. of Environmental Resources, 1986.
- Hearing on Permit Application for Hazardous Waste Disposal Facility in Louisiana; CECOS, 1989.
- Hearing on Permit Application for Municipal Waste Landfill in Edgemont, South Dakota; SDDS, 1989, 1990.
- Suit on Constitutionality of Law Concerning Legislative Review of Permit Applications for Large Solid Waste Landfills in South Dakota; SDDS, 1991.
- Hearing on Application for Fly Ash Disposal Permit for Texas Utilities Mining Company, Dallas, Texas; 1991.
- Suit on Insurance Coverage for Cleanup Costs at Texas Sites, Monsanto Company, 1992-Present.

Review of EPA Manuals and Documents:

- Handbook for Slurry-Wall Cutoffs, 1982.
- Technical Resource Document on Permeability Testing, 1984.
- Technical Resource Document on Clay Liners, 1985.
- Technical Resource Document on Hazardous Waste Impoundments, 1989.
- Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites, 1990
- Engineering Bulletin on Final Covers, 1991
- Engineering Bulletin on Vertical Cutoff Walls, 1991
- Technical Manual for Solid Waste Disposal Facility Criteria - 40 CFR Part 258, 1992

Advisory Boards and Professional Boards:

- Organizing Committee, Madison Waste Conference, Univ. of Wisconsin, 1989 - Present
- Technology Advisory Board, Warzyn Engineering, Madison Wisconsin, 1991-92.
- Technical Advisory Panel, Browning-Ferris Industries, 1992-93.
- Board of Directors, United States Society of Universities Conducting Geotechnical Engineering Research, 1992-93.
- Member, Geotechnical Board, National Research Council, 1993-1994.
- Member, Board on Energy and Environmental Systems, National Research Council, National Academy of Sciences, 1994-present

Training Workshops:

- Clay Liners, D'Appolonia Engineers, Pittsburgh, Pennsylvania, 1982.
- Waste Disposal, Law Engineering and Testing Co., Atlanta, Georgia, 1985.
- Clay Liners, Chen and Associates, Denver, Colorado, 1986.
- Clay Liners and Soil Permeability, Woodward-Clyde Consultants, St. Louis, Missouri, 1986.
- Field Testing of Soil Liners, Earth Technology Corp., Long Beach, California, 1986.

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- Site Remediation, Center for Hazardous Materials Research, Pittsburgh, Pennsylvania, 1987.
- Landfills and Impoundments, Association of Engineering Geologists, Atlanta, Georgia, 1987.
- Requirements for Hazardous Waste Landfill Design, Construction, and Closure; U.S. EPA, San Francisco, Seattle, Dallas, Chicago, Denver, Kansas City, Philadelphia, Atlanta, New York City, and Boston, 1988.
- Waste Disposal, Studio Geotecnico Italiano, Milan, Italy, 1989.
- Clay Liners and Covers, Ohio EPA, Columbus, Ohio, 1989.
- Landfill Design Course, New York Dept. of Environmental Conservation, Albany, New York, 1989.
- Clay Liners and Covers, Michigan Dept. of Natural Resources, Holland, Michigan, 1989.
- Advanced Landfill Design, Construction, and Closure Seminar, New York Dept. of Environmental Conservation, Albany, New York, 1990.
- Clay Liners and Covers for Landfills, for Waste Management, Inc., Chicago, 1991.
- Construction Quality Assurance for Landfills, New York Dept. of Environmental Conservation, Albany, New York, 1990, 1991, 1992.
- Waste Containment Barriers, Studio Geotecnico Italiano, Milan, Italy, 1990.
- Design and Construction of RCRA/CERCLA Final Covers; U. S. EPA, Atlanta, Philadelphia, Boston, Dallas, Kansas City, Denver, New York, Chicago, Seattle, and San Francisco, 1990; Albany, NY, 1992.
- Construction Quality Assurance and Quality Control for Waste Containment Facilities; Mid-Atlantic Branch, Solid Waste Association of North America, Annapolis, MD, 1994.
- Construction Quality Assurance and Quality Control for Waste Containment Facilities; U.S. EPA, Boston, Atlanta, New York, Philadelphia, Dallas, San Francisco, Seattle, Chicago, Kansas City, Denver, 1994.

Honors and Awards

Tau Beta Pi

Phi Kappa Phi

Norman Medal, American Society of Civil Engineers, 1975

Croes Medal, American Society of Civil Engineers, 1984

Outstanding Paper Award, Texas Section, ASCE, 1980

Listed in *Who's Who in Engineering*

Listed in *International Who's Who in Engineering*

Listed in *Who's Who in American Education*

Listed in *Who's Who in Science and Engineering*

William J. Murray Fellowship in Engineering, 1985 - 1992

Faculty Excellence Award, College of Engineering, 1989

Standards Development Award, American Society for Testing and Materials, 1991

L.B. (Preach) Meaders Professorship in Engineering, Univ. of Texas, 1992 - Present.

Member, Geotechnical Board, National Research Council, 1993 - 1994.

Special Service Award, American Society for Testing and Materials, 1994.

Journal Editorships

Editor, *Journal of Geotechnical Engineering*, American Society of Civil Engineers, 1992 - Present.

Professional Registration

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Registered Professional Engineer in Texas, Mississippi, and Delaware

Professional Society Committees

ASTM Committee D-18 on Soil and Rock (1981-present)
ASTM Subcommittee D-18.04 on Ground Water and Hydrologic Properties of Soil and Rock
(Chairman, 1986-1991)
ASTM Subcommittee D-18.14 on Geotechnics of Waste Management (1981-Present)
ASTM Subcommittee D-18.20 on Hydraulic Barriers (1981-present)
ASTM Committee D34 on Waste Management (1987-1990)
ASTM Committee D35 on Geosynthetics (1990-present)
ASCE Committee on Environmental Geotechnology, Geotechnical Engineering Division
(Chairman, 1987-92)
ASCE Committee on Computer and Numerical Methods, Geotechnical Engineering Division
(Control Group Member, 1984-88)
ASCE Committee on Publications in Geotechnical Engineering (Chairman, 1992- present)
ASTM Conference Co-Chairman for 1993 Symposium on "Hydraulic Conductivity and Waste
Contaminant Transport in Soils"
ASCE Organizing Committee for 1995 Specialty Conference on "The Geoenvironment 2000"
(Chairman, 1991-Present)

Sponsored Research Projects

"Computer Modeling of a Groundwater Movement in Soils beneath Waste Disposal Sites,"
Bureau of Engineering Research, 1981, \$3,000.

"Moisture Movement in Soils beneath Solar Evaporation Ponds," Underground Resource
Management, 1981, \$30,000.

"Compacted Clay for Lining Toxic Waste Disposal Ponds," University Research Institute,
1982, \$4,500.

"Design of Pile Foundations for Tension-Leg Platforms," Marathon Oil Company, Mobil
Research and Development Corp., and Phillips Petroleum Company, 1982, \$24,000.

"Effects of Hydraulic Gradient and Field Testing on Measurement of Hydraulic Conductivity of
Soil," U.S. EPA, Municipal Environmental Research Laboratory, Solid and Hazardous Waste
Research Division, 1982, \$144,785.

"Permeability of Compacted Clay Used to Line Waste Disposal Pits," National Science
Foundation, 1982, \$48,000.

"Analysis of Groundwater Flow at a Site Near Pampa, Texas," Underground Resource
Management, 1982, \$2,500.

"Feasibility of Sealing Disposal Pits for Drilling Fluids with Sand Blankets or Synthetic
Fabrics," Texas Petroleum Research Committee, 1982, \$15,112.

"Effects of Landfill Leachates on Natural Liner Systems," Chemical Manufacturers'
Association, 1983, \$39,980, (with Dr. H. M. Liljestrand).

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- "Moisture-Suction and Permeability of Unsaturated Soil," Woodward-Clyde Consultants, 1983, \$10,000.
- "Monitoring the Vadose Zone near Low-Level Radioactive Waste Disposal Sites," Texas Low-Level Radioactive Waste Disposal Authority, 1984, \$4,983.
- "Stabilization of Compacted Clay against Attack by Organic Chemicals," Chemical Manufacturers' Association, 1984, \$35,000.
- "Migration of Simulated Chemical Wastes through the Ground," University Research Institute, 1984, \$5,516.
- "Optimizing Construction Criteria for Hazardous Waste Clay Liners," U.S. EPA, Hazardous Waste Engineering Research Laboratory, 1985, \$54,327.
- "Rate of Flow of Leachate through Clay Soil Liners," U.S. EPA, Hazardous Waste Engineering Research Lab., 1985, \$162,257, (with Dr. H. M. Liljestrand).
- "Disposal of Low-Level Radioactive Waste at a Site Underlain by Evaporite Deposits," Texas Low-Level Radioactive Waste Disposal Authority, 1985, \$27,604 (with Dr. P. P. Nelson).
- "Early Warning Monitoring Systems for Hazardous Waste Disposal Sites," University Research Institute, 1985, \$5,000.
- "Hazardous Waste Management Approaches to Protect Water Quality," Texas Water Development Board, 1986, \$214,651, (with Drs. R. C. Loehr and R. J. Charbeneau).
- "Comparison of Federal and State Regulations for Disposal of Mixed Radioactive and Hazardous Waste," Texas Low-Level Radioactive Waste Disposal Authority, 1986, \$5,077.
- "Thickness of Clay Liners," U.S. EPA, Hazardous Waste Engineering Research Laboratory, 1987, \$35,931, (with Dr. R. J. Charbeneau).
- "Electrokinetic Detoxification of Contaminated Soils," State of Texas, 1988-89, \$44,500, (with Dr. H. M. Liljestrand).
- "Land Disposal Research Needs - A Forward Oriented Review," Environmental Protection Agency, 1989-90, \$75,000 (with R.C. Loehr).
- "Innovative Technologies for Capping Land Disposal Facilities," Gulf Coast Hazardous Substance Research Center and U. S. Environmental Protection Agency, 1989-90, \$33,000.
- "Removal of Organics from Contaminated Sludges and Soils with Surfactants and Electricity," State Hazardous Waste Management Research Funds, 1989-90, \$25,000.
- "Permeability Study," Hall Southwest Water Consultants, Inc., 1989, \$40,000.
- "Barrier Equivalency of Liner and Cap Materials," U. S. Environmental Protection Agency, 1989-93, \$282,365.

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"Construction of Disposal Units," Texas Low-Level Radioactive Waste Disposal Authority, 1990, \$9,062.

"Electrokinetic Decontamination of Soils," Gulf Coast Hazardous Substance Research Center, 1991-92, \$32,115.

"Construction Quality Assurance for Waste Containment Facilities," (with R. M. Koerner), U. S. Environmental Protection Agency, 1991-1993, \$189,964.

"Effects of Partial Wetting of Gundseal on Strength and Hydrocarbon Permeability," Gundle Lining Systems, Inc., 1991-1992, \$14,797.

"Enhanced Remediation of Contaminated Soil with In Situ Soil Heating and Vapor Extraction," (with R. J. Charbeneau and H. M. Liljestrand), Environmental Solutions Program, 1991-1992, \$24,814.

"Composite Geosynthetic Materials to Prevent Environmental Damage from Accidental Release of Stored Chemicals," Texas Advanced Technology Program, 1991, 1993, \$130,000.

"Enhanced Vapor Extraction of Organics from Contaminated Soil Using Radio Frequency Heating," Gulf Coast Hazardous Substance Research Center, 1992-93, \$122,639.

"Effects of Leachate on the Permeability of Bentonite and Modified Bentonite in Gundseal," Gundle Lining Systems, Inc., 1992-93, \$14,997.

"Analysis of Two Proposed Hazardous Waste Landfills," Mississippi Department of Environmental Quality and Mississippi State University, 1992, \$17,952.

"Use of Recycled Waste Tires for Pollution Prevention from Leaking Hydrocarbon Storage Tanks and Pipelines," Environmental Solutions Program, 1992-93, \$23,675.

"In-Situ Integrated Program Technical Support Group on In-Situ Containment," Battelle Pacific Northwest Laboratories, 1993-94, \$38,297.

"DNAPL Removal from Soil Using Surfactant-Enhanced Flushing in a Bench-Scale Model Aquifer," Environmental Solutions Program, 1993-94, \$22,204.

"Performance of Waste Containment Systems," (with R.M. Koerner at Drexel University and Rudy Bonaparte at GeoSyntec Consultants), U.S. Environmental Protection Agency, 1993-96, \$900,000.

"Workshop on Cone Penetration Testing," (with K.H. Stokoe), U.S. Army Research Office, 1994, \$13,783.

Research Grants

Grant from Vulcan Materials Company for Research on Clay Liners, 1991-92, \$14,000.

Grant from James Clem Corporation for Research on Geosynthetic Clay Liners, 1992, \$10,000.

Grant from Gundle Lining Systems for Research on Geosynthetic Clay Liners, 1993-94, \$21,000.

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Books

Geotechnical Practice for Waste Disposal, D. E. Daniel (Ed.), Chapman and Hall, London, 1993, 683 p.

Waste Containment Systems: Construction, Quality Assurance, and Quality Control, David E. Daniel and Robert M. Koerner, ASCE Press, New York (in press & scheduled for release in 1995)

Chapters of Books

Daniel, D. E., "Waste Disposal and Underground Storage," in *Ground Engineer's Reference Book*, F. G. Bell (ed.), Butterworths, London, 1987, pp. 43/1-43/10.

Daniel, D.E., "Hydraulic Conductivity Tests for Clay Liners," *Geotechnical and Geohydrological Aspects of Waste Management*, D. Van Zyl et al. (eds.), Lewis Publishers, Chelsea, Michigan, 1987, pp. 15-34.

Brown, K. W., and D. E. Daniel, "Influence of Organic Liquids on the Hydraulic Conductivity of Soils," Section 4.3 in Chapter 4 of *Land Disposal of Hazardous Waste*, J.R. Gronow, A.N. Schofield, and R.K. Jain (eds.), Ellis Horwood Limited, Chichester, England, 1988, pp. 199-216.

Daniel, D.E., and K.W. Brown, "Landfill Liners: How Well Do They Work and What Is Their Future?" Section 4.6 in Chapter 4 of *Land Disposal of Hazardous Waste*, J.R. Gronow, A.N. Schofield, and R.K. Jain (eds.), Ellis Horwood Limited, Chichester, England, 1988, pp. 235-244.

Daniel, D.E., and C.D. Shackelford, "Containment of Landfill Leachate with Clay Liners," Chapter 5.3 of *Sanitary Landfilling*, T.H. Christensen, R. Cossu, and R. Stegmann (Eds.), Academic Press, London, 1989, pp. 323-342.

Daniel, D.E., "Overview of Geoenvironmental Principles Applied to Remediation of Contaminated Waste Disposal Sites," in *Environmental Geotechnology*, M. A. Usmen and Y. B. Acar (Eds.), A. A. Balkema, Rotterdam, The Netherlands, 1992, pp. 311-320.

Daniel, D. E., "Introduction," Chapter 1 of *Geotechnical Practice for Waste Disposal*, D. E. Daniel (Ed.), Chapman and Hall, London, 1993, pp. 1-14.

Daniel, D.E., "Landfills," Chapter 5 of *Geotechnical Practice for Waste Disposal*, D. E. Daniel (Ed.), Chapman and Hall, London, 1993, pp. 97-112.

Daniel, D.E., "Clay Liners," Chapter 7 of *Geotechnical Practice for Waste Disposal*, D. E. Daniel (Ed.), Chapman and Hall, London, 1993, pp. 137-163.

Daniel, D.E., and R.M. Koerner, "Cover Systems," Chapter 18 of *Geotechnical Practice for Waste Disposal*, D. E. Daniel (Ed.), Chapman and Hall, London, 1993, pp. 455-496.

Charbeneau, R.J., and D.E. Daniel, "Contaminant Transport in Unsaturated Flow," Chapter 15 of *Handbook of Hydrology*, McGraw-Hill, New York, 1993, pp. 15.1 - 15.54.

Conference Proceedings

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Hydraulic Conductivity and Waste Contaminant Transport, David E. Daniel and Stephen J. Trautwein (Eds.), American Society for Testing and Materials, Philadelphia, 1994.

Refereed Publications

Daniel, D. E., and R. E. Olson, "Stress-Strain Properties of Compacted Clays," *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 100, No. GT10, 1974, pp. 1123-1136.

Olson, R. E., Daniel, D. E., and T. K. Liu, "Finite Difference Analyses of Sand Drain Problems," *Proceedings*, American Society of Civil Engineers Specialty Conference on Analysis and Design in Geotechnical Engineering, June, 1974, Vol. 1, pp. 85-110.

Johnson, L. J., Daniel, D. E., Abelle, W. V., Ledbetter, J. O., and W. R. Hansen, "Effects from Past Solid Waste Disposal Practices," *Environmental Health Perspectives*, Vol. 27, 1978, pp. 215-221.

Daniel, D. E., Hamilton, J. M., and R. E. Olson, "Suitability of Thermocouple Psychrometers for Studying Moisture Movement in Unsaturated Soils," in *Permeability and Groundwater Contaminant Transport*, ASTM STP 746, T. F. Zimmie and C.O. Riggs (Eds.), American Society for Testing and Materials, Philadelphia, 1981, pp. 84-100.

Hamilton, J. M., Daniel, D. E., and R. E. Olson, "Measurement of the Hydraulic Conductivity of Partially Saturated Soils," in *Permeability and Groundwater Contaminant Transport*, ASTM STP 746, T. F. Zimmie and C.O. Riggs (Eds.), American Society for Testing and Materials, Philadelphia, 1981, pp. 182-196.

Olson, R. E., and D. E. Daniel, "Measurement of the Hydraulic Conductivity of Fine-Grained Soils," in *Permeability and Groundwater Contaminant Transport*, ASTM STP 746, T. F. Zimmie and C.O. Riggs (Eds.), American Society for Testing and Materials, Philadelphia, 1981, pp. 18-64.

Daniel, D. E., "Measurement of Hydraulic Conductivity of Unsaturated Soils with Thermocouple Psychrometers," *Soil Science Society of America Journal*, Vol. 46, No. 6, 1982, pp. 1125-1129.

Daniel, D. E., and R. E. Olson, "Failure of an Anchored Bulkhead," *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 108, No. GT10, 1982, pp. 1318-1327.

Daniel, D. E., "Shallow Land Burial of Low-Level Radioactive Waste," *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 109, No. 1, 1983, pp. 40-55.

Daniel, D. E., "Permeability Test for Unsaturated Soil," *Geotechnical Testing Journal*, Vol. 6, No. 2, 1983, pp. 81-86.

Daniel, D. E., "Predicting Hydraulic Conductivity of Clay Liners," *Journal of Geotechnical Engineering*, American Society of Civil Engineers, Vol. 110, No. 2, 1984, pp. 285-300.

AR303435

- Daniel, D. E., Trautwein, S. J., Boynton, S. S., and D. E. Foreman, "Permeability Testing with Flexible-Wall Permeameters," *Geotechnical Testing Journal*, Vol. 7, No. 3, 1984, pp. 113-122.
- Daniel, D. E., Anderson, D. C., and S. S. Boynton, "Fixed-Wall Vs. Flexible-Wall Permeameters," *Hydraulic Barriers in Soil and Rock*, ASTM STP 874, A.I. Johnson et al. (Eds), American Society for Testing and Materials, Philadelphia, 1985, pp. 107-126.
- Day, S. R., and D. E. Daniel, "Field Permeability Test for Clay Liners," *Hydraulic Barriers in Soil and Rock*, ASTM STP 874, A.I. Johnson et al. (Eds), American Society for Testing and Materials, Philadelphia, 1985, pp. 276-288.
- Bowders, J. J., Daniel, D. E., Broderick, G. P., and H. M. Liljestrand, "Methods for Testing the Compatibility of Clay Liners with Landfill Leachate," *Hazardous and Industrial Solid Waste Testing: Fourth Symposium*, ASTM STP 886, J. K. Petros et al. (Eds.), American Society for Testing and Materials, Philadelphia, 1985, pp. 233-250.
- Boynton, S. S., and D. E. Daniel, "Hydraulic Conductivity Tests on Compacted Clay," *Journal of Geotechnical Engineering*, Vol. 111, No. 4, 1985, pp. 465-478.
- Day, S. R., and D. E. Daniel, "Hydraulic Conductivity of Two Prototype Clay Liners," *Journal of Geotechnical Engineering*, Vol. 111, No. 8, 1985, pp. 957-970.
- Daniel, D. E., "Can Clay Liners Work?" *Civil Engineering*, Vol. 55, No. 4, 1985, pp. 48-49.
- Daniel, D. E., S. J. Trautwein and D. McMurtry, "A Case History of Leakage from a Surface Impoundment," *Proceedings*, Symposium on Seepage from Dams and Impoundments, R. L. Volpe and W. M. Kelly (eds.), Denver, Colorado, May 5, 1985, American Society of Civil Engineers, New York, pp. 220-235.
- Daniel, D. E., "Clay Liners: Where Do We Go From Here?" *Proceedings*, International Conference on New Frontiers for Hazardous Waste Management, September 15-18, 1985, Pittsburgh, Pennsylvania, EPA/600/9-85/025, pp. 266-273.
- Daniel, D. E., and S. J. Trautwein, "Field Permeability Test for Earthen Liners," *Proceedings*, American Society of Civil Engineers Specialty Conference on In Situ Test Results, Virginia Tech University, Blacksburg, Virginia, June, 1986, pp. 146-160.
- Foreman, D. E., and D. E. Daniel, "Permeation of Compacted Clay with Organic Chemicals," *Journal of Geotechnical Engineering*, Vol. 112, No. 6, 1986, pp. 669-690.
- Daniel, D. E., "Under Ground, Over the Water Table," *Civil Engineering*, Vol. 57, No. 2, February, 1987, pp. 49-50.
- Daniel, D. E., "Earthen Liners for Land Disposal Facilities," *Proceedings*, Geotechnical Practice for Waste Disposal '87, R.D. Woods (Ed.), Ann Arbor, Michigan, June, 1987, American Society of Civil Engineers, New York, pp. 21-39.
- Bowders, J. J., and D.E. Daniel, "Hydraulic Conductivity of Compacted Clay to Dilute Organic Chemicals," *Journal of Geotechnical Engineering*, Vol. 113, No. 12, 1987, pp. 1432-1448.

AR303436



- Daniel, D. E., Shackelford, C. D., and W. P. Liao, "Transport of Inorganic Compounds through Compacted Clay Soil," *Proceedings, Fourteenth Annual Research Symposium on Land Disposal, Remedial Action, Incineration and Treatment of Hazardous Waste*, U.S. Environmental Protection Agency, Cincinnati, Ohio, May, 1988, EPA/600/9-88/021, pp. 114-125..
- Daniel, D. E., Liljestrand, H. M., Broderick, G. P., and J. J. Bowders, Jr., "Interaction of Earthen Liner Materials with Industrial Waste Leachate," *Hazardous Waste & Hazardous Materials*, Vol. 5, No. 2, 1988, pp. 93 - 108.
- Daniel, D. E., and C. D. Shackelford, "Disposal Barriers that Release Contaminants Only by Molecular Diffusion," *Nuclear and Chemical Waste Management*, Vol. 8, September, 1988, pp. 299-305.
- Daniel, D.E., "In Situ Hydraulic Conductivity Tests for Compacted Clay," *Journal of Geotechnical Engineering*, Vol. 115, No. 9, September, 1989, pp. 1205-1226.
- Daniel, D.E., "A Note on Falling-Headwater, Rising Tailwater Permeability Tests," *Geotechnical Testing Journal*, Vol. 12, No. 4, December, 1989, pp. 308-310.
- Shackelford, C.D., Daniel, D.E., and H.M. Liljestrand, "Diffusion of Inorganic Chemical Species in Compacted Clay Soil," *Journal of Contaminant Hydrology*, Vol. 4, 1989, p. 241-273.
- Benson, C.B., and D.E. Daniel, "The Influence of Clods on the Hydraulic Conductivity of a Compacted Clay," *Journal of Geotechnical Engineering*, Vol. 116, No. 8, 1990, p. 1231-1248.
- Broderick, G.P., and D.E. Daniel, "Stabilizing Compacted Clay Against Chemical Attack," *Journal of Geotechnical Engineering*, Vol. 116, No. 10, 1990, pp. 1549-1567.
- Elsbury, B.R., Daniel, D.E., Sradars, G.A., and D.C. Anderson, "Lessons Learned from a Compacted Clay Liner," *Journal of Geotechnical Engineering*, Vol. 116, No. 11, 1990, pp. 1641-1660.
- Daniel, D.E., "Summary Review of Construction Quality Control for Compacted Soil Liners," *Waste Containment Systems: Construction, Regulation, and Performance*, R. Bonaparte (ed.), American Society of Civil Engineers, New York, 1990, pp. 175-189.
- Daniel, D.E., and C.B. Benson, "Water Content-Density Criteria for Compacted Clay Liners," *Journal of Geotechnical Engineering*, Vol. 116, No. 12, 1990, pp. 1811-1830.
- Shan, H.Y., and D. E. Daniel, "Results of Laboratory Tests on a Geotextile/Bentonite Liner Material," *Proceedings, Geosynthetics '91*, Industrial Fabrics Association International, St. Paul, Minnesota, Vol. 2, 1991, pp. 517-535.
- Shackelford, C. D., and D. E. Daniel, "Diffusion in Saturated Soil: I. Background," *Journal of Geotechnical Engineering*, Vol. 117, No. 3, 1991, pp. 467-484.
- Shackelford, and D. E. Daniel, "Diffusion in Saturated Soil: II. Results for Compacted Clay," *Journal of Geotechnical Engineering*, Vol. 117, No. 3, 1991, pp. 485-506.

AR303437

Daniel, D. E., Burton, P. M., and S. D. Hwang, "Evaluation of Four Vadose Zone Probes Used for Leak Detection and Monitoring," *Current Practices in Ground Water and Vadose Zone Investigations, ASTM STP 717B*, D. M. Nielsen and M. N. Sora (Eds.), American Society for Testing and Materials, 1992, 124-139.

Daniel, D. E., "Law of the Landfill," *The Construction Specifier*, Vol. 44, No. 6, 1991, pp. 104-111.

Daniel, D. E., and R. M. Koerner, "Landfill Liners from Top to Bottom," *Civil Engineering*, Vol. 61, No. 12, 1991, pp. 46-49.

Koerner, R.M., and D.E. Daniel, "Better Cover-Ups," *Civil Engineering*, Vol. 62, No. 5, 1992, pp. 55-57.

Kim, W. H., and D. E. Daniel, "Effects of Freezing on the Hydraulic Conductivity of a Compacted Clay," *Journal of Geotechnical Engineering*, Vol. 118, No. 7, 1992, pp. 1083-1097.

Estornell, P., and D. E. Daniel, "Hydraulic Conductivity of Three Geosynthetic Clay Liners," *Journal of Geotechnical Engineering*, Vol. 118, No. 10, 1992, pp. 1592-1606.

Shelley, T. L., and D. E. Daniel, "Effect of Gravel on Hydraulic Conductivity of Compacted Soil Liners," *Journal of Geotechnical Engineering*, Vol. 119, No. 1, 1993, pp. 54-68.

Daniel, D. E., and Y. K. Wu, "Compacted Clay Liners and Covers for Arid Sites," *Journal of Geotechnical Engineering*, Vol. 119, No. 2, 1993, pp. 223-237.

Daniel, D.E., Shun, H.Y., and J.D. Anderson, "Effects of Partial Wetting on the Performance of the Bentonite Component of a Geosynthetic Clay Liner," *Proceedings, Geosynthetics '93*, Industrial Fabrics Association International, St. Paul, Minnesota, V. 3, 1993, pp. 1483-1496.

Benson, C. H., and D. E. Daniel, "Minimum Thickness of Compacted Soil Liners: I - Stochastic Models," *Journal of Geotechnical Engineering*, Vol. 120, No. 1, 1993, pp. 129-152.

Benson, C. H., and D. E. Daniel, "Minimum Thickness of Compacted Soil Liners: II - Analysis and Case Histories," *Journal of Geotechnical Engineering*, Vol. 120, No. 1, 1993, pp. 153-172.

Eykhoft, G.R., and Daniel, D.E., "Impact of System Chemistry on Electroosmosis in Contaminated Soil," *Journal of Geotechnical Engineering*, Vol. 120, No. 5, 1994, pp. 797-815.

Other Technical Publications (Partial List)

Daniel, D. E., "Problems in Predicting the Permeability of Compacted Clay Liners," *Proceedings, Fourth Annual Conference on Uranium Mill Tailings Disposal*, Colorado State University, Ft. Collins, Colorado, 1981, pp. 665-675.

Daniel, D. E., "Geotechnical and Geomechanical Parameters Required for Characterization of Sites," *Proceedings, Low-Level Waste Disposal: Site Characterization and Monitoring*, U. S. NRC, Arlington, Virginia, June 16-17, 1982, NUREG/CP - 0028, pp. 93-113.

- Truettwein, S. J.; Daniel, D. E., and M. W. Cooper, "A Case History Study of Water Flow through Unsaturated Soils," *Role of the Unsaturated Zone in Radioactive and Hazardous Waste Disposal*, J. W. Mercer, P. S. C. Rao, and L. W. Marine (eds.), 1983, Ann Arbor Science, Ann Arbor, Michigan, pp. 229-254.
- Foreman, D. E., and D. E. Daniel, "Effects of Hydraulic Gradient and Method of Testing on the Hydraulic Conductivity of Compacted Clay to Water, Methanol, and Heptane," *Proceedings, Tenth Annual Research Symposium on Land Disposal of Hazardous Waste*, U.S. EPA, EPA/600/9-84-007, April, 1984, pp. 138-144.
- Daniel, D. E., "Effects of Organic Chemicals on the Hydraulic Conductivity of Compacted Clay," *Proceedings, International Symposium on Clay Barriers for Isolation of Toxic Chemical Wastes*, Stockholm, Sweden, 1984.
- Daniel, D. E., "Effects of Organic Chemicals on Clay Liners," *Proceedings, Seventh Symposium on Management of Uranium Mill Tailings, Low-Level Waste, and Hazardous Waste*, Colorado State University, Ft. Collins, Colorado, February 6-8, 1985, pp. 383-390.
- Brown, K. W., and D. E. Daniel, "Potential Groundwater Implications of Land Disposal of Toxic Substances," in *Issues in Groundwater Management*, E. T. Smeardon and W. R. Johnson (eds.), Center for Research in Water Resources, Austin, Texas, 1985, pp. 387-402.
- Daniel, D. E., "Design, Construction, and Testing of Earth Liners," *Proceedings, Seminar on Geotechnical Aspects of Waste Management*, Metropolitan Section, American Society of Civil Engineers, Soils and Foundations Group, December 3-4, 1985, New York City, New York.
- Daniel, D. E., "Hydraulic Conductivity Tests for Clay Liners," *Geotechnical and Geohydrological Aspects of Waste Management*, D. Van Zyl et al. (eds.), 1987, Lewis Publishers, Chelsea, Michigan, pp. 15-34.
- Daniel, D. E., and C. D. Shackelford, "Disposal Barriers that Release Contaminants Only by Molecular Diffusion," *Proceedings, Oak Ridge Model Conference*, Oak Ridge, Tennessee, October, 1987.
- Liao, Wing P., and D.E. Daniel, "Time of Travel of Contaminants through Soil Liners," *Proceedings, Twelfth Annual Madison Waste Conference*, September 20-21, 1989, University of Wisconsin, p. 367-376.
- Daniel, D.E., "Keys to Successful Design, Construction, Testing, and Certification of Soil Liners for Landfills," *Journal of Municipal Solid Waste Management, Government Refuse Collection and Disposal Association*, Silver Spring, Maryland, Vol. 1, August, 1990, pp. 17-27.
- Grube, W. E., and D. E. Daniel, "Alternative Barrier Technology for Landfill Liner and Cover Systems," *Air & Waste Management Association Meeting*, Vancouver, B.C., June, 1991, Paper 91-5.9, 11 p.
- Daniel, D. E., "Compacted Clay and Geosynthetic Clay Linings," Presented at the 15th Geotechnical Conference, Politecnico di Torino, Torino, Italy, November, 1991, 23 p.

AR 303439

- Daniel, D. E., "Geosynthetic Clay Liners," *Geotechnical News*, Vol. 9, No. 4, 1991, pp. 28-33
- Daniel, D.E., "Overview of Geoenvironmental Principles Applied to Remediation of Contaminated Waste Disposal Sites," in *Environmental Geotechnology*, M.A. Usmen and Y.B. Acar (Eds.), Balkema, Rotterdam, pp. 311-319.
- Daniel, D.E., "Case Histories of Compacted Clay Liners and Covers for Waste Disposal Facilities," *Proceedings: Third International Conference on Case Histories in Geotechnical Engineering*, Univ. of Missouri, Rolla, Missouri, Vol. 2, 1993, pp. 1407-1425.
- Daniel, D.E., "Pollution Prevention in Landfills Using Engineered Final Covers," *Proceedings, Green '93*, University of Bolton, Bolton, England, 1993.
- Daniel, D.E., "Geosynthetic Clay Liners (GCLs) in Landfill Covers," *Proceedings, Thirty-First Annual Solid Waste Exposition*, The Solid Waste Management Association of North America, Silver Spring, Maryland, 1993.
- Koerner, R.M., and Daniel, D.E., "Technical Equivalency Assessment of GCLs to CCLs," in *Geosynthetic Liner Systems: Innovations, Concerns, and Designs*, R.M. Koerner and R.F. Wilson-Fahmy (Eds.), Industrial Fabrics Association International, St. Paul, MN pp. 265-285.
- Daniel, D.E., and Koerner, R.M., "Technical Guidance Document, Quality Assurance and Quality Control for Waste Management Facilities," U.S. Environmental Protection Agency, EPA/600/R-93-182, 305 p.
- Koerner, R., and Daniel, D., "A Suggested Methodology for Assessing the Technical Equivalency of GCLs to CCLs," *Proceedings, Geokunststoff-Ton-Dichtungen, GTD*, H. Zanzinger (Ed.), Nurnberg, Germany, 1994, pp. 61-83.
- Daniel, D.E., "Why Aren't Regulators More Receptive to Geosynthetic Clay Liners?" *Geotechnical Fabrics Report*, Vol. 12, No. 4, 1994, pp. 44-46.
- Last Revision, September, 1994.

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ATTACHMENT 2
DRAFT AGENDA

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PROPOSED AGENDA (PRELIMINARY)
PRESENTATION TO USEPA REGION III
TECHNICAL ASPECTS OF CONTAINMENT REMEDIES OF SOILS
CONTAMINATED WITH METALS:
CAPPING AND SOLIDIFICATION/STABILIZATION

Philadelphia, Pennsylvania
9:00 a.m. - December 13, 1994

1. INTRODUCTION (*Susan Fullerton, P.E., Parsons Engineering Science, Inc.*) - 5 minutes
 - Purpose of the Presentation
 - Introduction of the Group
2. BACKGROUND INFORMATION RELATED TO CONTAINMENT REMEDIES (*Susan K. Fullerton, P.E., and David B. Babcock, Parsons ES*) - 15 minutes
 - Superfund Reformation
 - Containment Remedies
 - Historical Usage at Superfund Sites
 - Projected Future Use/Changing Regulatory Image of Containment Remedies
 - Advantages/Disadvantages
3. SOLIDIFICATION/STABILIZATION (S/S) TECHNOLOGIES (*Paul Bishop, Ph.D, P.E., University of Cincinnati*) - 1 hour

Description of S/S Technology (Process Summary)

 - Historic Usage
 - *In situ* Applications
 - *Ex situ* Applications
 - Process Evaluation
 - Advantages/Limitations
 - Use as Innovative Technologies at Superfund Sites
 - "Hot Spot" Treatment
 - Reuse of S/S Material
 - Evaluation of S/S vs. USEPA Remedy Screening Criteria
 - Long-term Protection of Human Health and the Environment
4. CAPPING TECHNOLOGIES (*David E. Daniel, Ph.D., P.E., University of Texas*) - 1 hour
 - Basic Functions of Cover Systems
 - Environmental Factors Affecting Cover Design
 - Cover System Components/Design
 - Advantages/Limitations
 - Historic Usage
 - Evaluation of Cover System Usage vs. USEPA Remedy Selection Criteria
 - Long-term Protection of Human Health and the Environment
 - Effectiveness
 - Elimination of Pathway Completion
 - Long-term Effectiveness (cover system life, maintenance requirements)
5. SUMMARY (*Susan Fullerton*) - 10 minutes
6. QUESTIONS/COMMENTS