JAMES DRAGUN, Ph.D.
Soil Chemist
Forensics Expert

Professional Experience

Dr. Dragun has assessed the migration and degradation of chemicals and waste in soil/groundwater systems of national and international concern: dioxin in Missouri and New Jersey; polybrominated biphenyl (PBB) in Michigan; radionuclides at Three Mile Island Nuclear Power Plant in Pennsylvania; the oil lakes in Kuwait, following the Persian Gulf war in 1991; lead at Missouri's Lake of the Ozarks; polychlorinated biphenyl (PCB) and petroleum spills across the U.S. and at the G & H Landfill in Michigan; organics and inorganics at the Stringfellow Acid Pits; pesticides in San Joaquin Valley groundwater; solvents in Silicon Valley groundwater; and metals and organics in Woburn, Massachusetts.

Dr. Dragun has analyzed and co-designed physical, chemical, and biological treatment processes to cleanup soil and groundwater containing chemicals and wastes from landfills, surface impoundments, underground storage tanks, land treatment systems, manufacturing and processing facilities, and hazardous waste sites. He has conducted R & D work since 1972, focusing on soil forensics, soil remediation, and fixation/stabilization processes.

Dr. Dragun has analyzed and co-designed engineering controls to inhibit chemical and waste migration from landfills, surface impoundments, underground storage tanks, land treatment systems, manufacturing and processing facilities, and hazardous waste sites.

Dr. Dragun has previously counseled the U.S. Environmental Protection Agency (EPA), as a group member of nationally recognized experts, on the potential environmental migration and degradation of chemicals that are candidates for regulatory action. Chemicals include isocyanates, dioxin, DBCP and other pesticides, solvents, formaldehyde, metals, radionuclides, and petroleum products. His findings have been disseminated and utilized by 24 nations including Japan, Canada, the United Kingdom, Australia, Kuwait, West Germany, Switzerland, Italy, France, Spain, Scandinavia, and the Netherlands.

While he was a staff member of the U.S. EPA in Washington, D.C., Dr. Dragun was appointed the primary technical advisor on exposure assessment to the Interagency Testing Committee. The Committee is a consortium of 14 federal agencies that select chemicals for potential regulatory control. Member agencies include the National Science Foundation, President's Council on Environmental Quality, National Cancer Institute, Occupational Safety and Health Administration, Department of Defense, Food and Drug Administration, and others. He has authored exposure assessments for over 100 chemicals and wastes.

Expert Committee Appointments

One of six nationally recognized scientists and engineers appointed to the Council for Health and Environmental Safety of Soils (CHESS). The Council guides the development of soil cleanup standards that protect human health and the environment. Sponsors include the U.S. EPA, Agency for Toxic Substances and Disease Registry, Chevron, Eastman Kodak, Electric Power Research Institute, Ford, General Electric, Gillette, Goodyear, Hercules, Hoechst Celanese, Morton Thiokol, Public Service Gas & Electric, Shell, Texaco, and Union Carbide (1988 - 1992).

Elected chairman of a committee of internationally recognized experts on analytical methods and environmental fate (Forensics) of petroleum and its products in soil systems. Committee's mission is to evaluate the technical basis and applicability of analytical methods and models that assess the migration and degradation of petroleum and its products in soil systems. Committee sponsored by CHESS and the International Society of Regulatory Toxicology and Pharmacology (1989 - 1992).

Appointed expert reviewer of U.S. EPA R & D programs and projects. (The U.S. EPA is required by the U.S. Congress to have national experts critique its R & D programs for technical accuracy and completeness.) Program and project areas include

- Landfill and lagoon sitting, design, and construction
- Landfill and lagoon failure mechanisms
- Landfill cleanup
- Dioxin treatment technologies
- Techniques for enhanced recovery of contaminated groundwater
- In-situ soil treatment technologies including soil vapor extraction, soil flushing/washing, bioremediation, solidification/stabilization, in situ vitrification, hydrolysis, steam stripping, oxidation/reduction, and radio frequency heating.

One of five nationally recognized scientists appointed to guide the GW-21 Project of the American Petroleum Institute. The project is developing (a) computer software to estimate chemical concentrations in soil, groundwater, and air due to releases from various sources; and (b) a consistent approach to be utilized across the U.S.A. for conducting exposure and risk assessments and for evaluating risk (1991 - 1994).

Appointed to the Advisory Board of the Association for the Environmental Health of Soils (AEHS). AEHS disseminates data and information on contaminated soils. Its membership is comprised of professionals practicing chemistry, geology, hydrogeology, engineering, modeling, toxicology, regulatory science, and law.

One of 12 scientists and engineers selected from a panel of 161 national experts in environmental science, environmental engineering, hydrogeology, toxicology, and waste management to serve on a committee sponsored by the U.S. Department of Health and Human Services. The mission of this

committee was to (a) assess the quality of hazardous waste management programs offered by universities, institutes, and associations within the United States; (b) develop criteria for evaluating courses offered by these programs; (c) assess the need and requirements for certification and/or registration of scientists and engineers working in Environmental and Waste Management; and (d) create a curriculum of required courses for a M.S. in Hazardous Waste Management for U.S. colleges and universities (1988 - 1991).

Appointed to the Scientific Advisory Board for the Petroleum Contaminated Soils Conference (1987 - 1994). The Board develops conference programs in areas dealing with cleanup standards, analytical methodologies and product identification, environmental fate and modeling, exposure and risk assessment, and soil and groundwater remediation. Conferences were sponsored by the American Petroleum Institute, Association of American Railroads, U.S. Department of Energy, Edison Electric Institute, and the U.S. EPA.

Invited member of a panel of international experts on biodegradation that assessed methane enhancement of soil and groundwater bioremediation technologies. Panel was sponsored by the Gas Research Institute (1987).

Appointed the General Referee for Chemical/Waste Interactions in Soil by the Association of Official Analytical Chemists (AOAC), an international organization that develops standard test methods. Directed AOAC's development of standard methods to measure the migration and degradation of chemicals and wastes (a) from waste treatment and disposal facilities, (b) in soil, and (c) in groundwater (1984 - 1988).

Co-led a group of nationally and internationally recognized scientists and engineers that identified and prioritized U.S. EPA environmental fate R & D needs (1979 - 1980).

Honors, Awards, and Appointments

Appointed Editor-in-Chief of the International Journal of Soil and Sediment Contamination, a peer-review journal addressing soil remediation, health assessment, chemical analysis, chemical fate, and field investigations. Dr. Dragun sets journal standards, oversees a 55-member review board comprised of scientists and engineers, and resolves technical disputes.

Appointed Professor of Geology (adjunct), Wayne State University, Detroit, Michigan.

Appointed Professor (adjunct), University of Massachusetts, Amherst.

Elected President and Director of the Liquid and Solid Waste Industrial Control Association (LICA), a Great Lakes regional association of hazardous waste generators, transporters, and firms involved with treatment and disposal.

Appointed to the Scientific Review Board of Soils, a scientific and engineering publication that

disseminates data and information on soil research, the fate of chemicals in soil, soil field investigations, soil risk assessment, and soil treatment technologies.

Appointed reviewer of research proposals on the fate and remediation of chemicals in soil systems for the Natural Sciences and Research Council of Canada.

Appointed reviewer of data and literature reviews for Environment Canada and the Canadian Council of Ministers of the Environment. Results of these reviews are utilized to select or change Canadian cleanup standards for soil, groundwater, and surface water.

Awarded a Distinguished Service Award by the Liquid and Solid Waste Industrial Control Association in 1990.

Invited instructor for a series of lectures in Kuwait City, Kuwait, on the fate and remediation of crude oil-contaminated soil by the Kuwait Foundation for the Advancement of Science and the Arab School of Science and Technology (1995).

Invited instructor of courses on soil chemistry, soils, basic hydrogeology, chemical fate, and waste management. Courses are attended by engineers, geologists, hydrogeologists, and environmental scientists from over 325 consulting firms; 45 state regulatory agencies; 22 U.S. government agencies; 19 foreign government agencies; 87 law firms; and 185 industrial corporations. Courses have been sponsored by the Hazardous Materials Control Research Institute (HMCRI), Air Pollution Control Association, Association of Bay Area Governments (CA), Spill Control Association of America, and the University of Massachusetts.

Awarded the U.S. EPA Bronze Medal for distinguished service in 1980.

Based on meritorious research and scholarship, elected into membership of Phi Kappa Phi and Sigma Xi, two international scientific societies.

Awarded a Penn State Distinguished Service Awarded in 1977.

Accomplishments are listed in "Who's Who in the World," " Who's Who in America," "American Men and Women of Science," "Who's Who in Science and Engineering," "Directory of Distinguished Americans," and "Who's Who in the Midwest."

Registrations and Certifications

Awarded registration as a certified professional soil specialist No. 823 by ARCPACS.
Awarded registration as a certified professional agronomist No. 823 by ARCPACS.

Awarded registration as environmental assessor No. REA-02781 by the Secretary for Environmental Protection, State of California.

Education

Ph.D. and M.S. in soil chemistry (agronomy), Penn State University (1977 and 1975) and B.S. in chemistry, Wayne State University (1971)

Postgraduate studies in hydrogeology (saturated zone) and civil engineering, University of California of Berkeley (1982 - 1984); postgraduate study in hydrogeology (unsaturated zone), Penn State University (1975)

Postgraduate studies in medicinal chemistry and human physiology, National Institutes of Health, Bethesda, MD (1979 - 1981)

Patents

Englert CJ and Dragun J. A Method and Apparatus for Improving Degradation of an Unsecured Landfill. U.S. Patent No. 5,605,417.

Books

Dragun J. 1998. The Soil Chemistry of Hazardous Materials. Second Edition. Amherst, MA: Amherst Scientific Press. 830 pgs. (NOTE: This textbook is utilized by over 25 colleges and universities in North America for courses on soils, soil pollution, and the fate of chemicals in soil systems).

Kostecki PT, Calabrese EJ, and Dragun J (ed). 2001. Contaminated Soils. Volume 6. Amherst, MA: Amherst Scientific Publishers.

Dragun J. and Barkach JH. 2003. Elements in North American Soils: Second Edition. Amherst MA: Amherst Scientific Publishers (in Press).

Dragun J. 2003. Chemical Phytoxicity in Soils. Amherst, MA: Amherst Scientific Publishers (in Press).

Dragun J and Chaisson A. 1991. Elements in North American Soils. Silver Spring, MD: The Hazardous Materials Control Research Institute.

Mason SA and Dragun J. 1996. Natural Chemicals in Sediments. Amherst, MA: Amherst Scientific Publishers.

Dragun J. 1988. The Soil Chemistry of Hazardous Materials. Silver Springs, MD: Hazardous Materials Control Research Institute.

Publications

Dr. Dragun has authored or co-authored over 70 technical publications on soil chemistry and on the engineering aspects of hazardous waste management; some of these publications are listed below:

Kuhn W, Mersereau-Kempf J, and Dragun J. 2003. Bench-Scale Studies on PCE Volatilization from Soil and PCE Volatilization from Soil Treated by Roto-Tilling. Journal of Soil Contamination (in Press).

Dragun J. 2000. Historical Perspective: Setting Soil Cleanup Levels in the U.S. IN Proceedings of the 3rd International Workshop on Risk Evaluation and Management of Chemicals. Japan Science & Technology Corporation, Institute of Environmental Science & Technology, and Yokohama National University, Yokohama, Japan. January 27-28, 2000. Yokohama, Japan: Yokohama National University.

Dragun J and Barkach JH. 2000. Overview: Fate of Petroleum in Soil systems. IN Assessment and Remediation of Oil Contaminated Soils. Arab School on Science and Technology. State of Kuwait. 18-22 March 1995. Amherst, MA: Amherst Scientific Publications.

Sklash M, Schroeder M, and Dragun J. 1999. Groundwater models: Can you believe what they are saying? Natural Resources and Environment. 13(4): p542-545.

Kuhn W, Gambino R, Al-Awadhi N, Bacba MT, and Dragun J. 1998. Growth of Tomato Plants in Kuwaiti Soil Contaminated with Crude Oil. Journal of Soil Contamination 7(6): 801-806.

Dragun J, Gambino R, and Kuhn W. 1996. Coloration Changes of Geologic Media After Addition of Gasoline, Diesel Fuel, and Ethylbenzene. Journal of Soil Contamination 5(1): 1-8.

Dragun J, Barkach JH, and Sklash MG. 1995. Chapter 4. Transport and Transformation of Chemicals in Soil Systems: 1995 Research Needs. IN Kostecki P and Calabrese EJ (eds). Hydrocarbon Contaminated Soils. Volume 5. Amherst, MA: Amherst Scientific Publications.

Barkach JH, Dragun J, Mason SA, and Bolin J. 1993. Regulatory impact of the historic use of foundry sand as fill material. Journal of Environment Engineering and Management 3(2): 26-32.

Dragun J. 1993. An Eh-pH reactor that simulates soil/groundwater systems. Journal of Soil Contamination 2(1): 27-36.

Englert CJ, Alexander BA, and Dragun J. 1992. Technical alternatives for cleanup of petroleum and petroleum products in soil and groundwater. Journal of Environmental Engineering and Management 2(4): 7-13.

Publications (Cont'd)

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Aid for Evaluation of the Remediation of Industrial Sites (AERIS) - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Seasonal Soil Compartment Model (SESOIL) - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Leaking Underground Fuel Tank (LUFT) Field Manual - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. GEOTOX, A Multicompartmental Model - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. MYGRT: An IBM personal computer code for simulating solute migration in groundwater - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Pesticide Root Zone Model (PRZM) - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. POSSM (PCB Onsite Spill Model) - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Preliminary Pollutant Limit Value Approach (PPLV) - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Dragun J (Chair), Bauman B, Bonazountas M, Conrad D, Mackay D, and Potter T. 1992. Risk Assessment/Fate and Transport (RAFT) Modeling System - Fate Evaluation. IN Calabrese EJ and Kostecki P (eds). Risk Assessment and Environmental Fate Methodologies. Chelsea, MI: Lewis Publishers.

Publications (Cont'd)

Englert CJ, Kenzie EJ, and Dragun J. 1992. Bioremediation of Petroleum Products in Soil. IN Calabrese EJ and Kostecki P (eds). Principles and Practices of Hydrocarbon Contaminated Soils. Chelsea, MI: Lewis Publishers.

Mason SA, Barkach JH, and Dragun J. 1992. Effect of filtration on colloid transport in soil. Ground Water 30(1): 104-106.

Dragun J, Barkach JH, and Mason SA. 1992. Why EP-Tox, TCLP, and the California WET do not derive data on the mobility and transformations of metals in soil systems. IN Kostecki P and Calabrese EJ (eds). Principles and Practices of Hydrocarbon Contaminated Soils. Chelsea, MI: Lewis Publishers.

Dragun J. 1991. Geochemistry and soil chemistry reactions occurring during in situ vitrification. Journal of Hazardous Materials 26: 343-364.

Dragun J, Barkach JH, and Mason SA. 1991. What do we really know about the fate of diesel fuel in soil? Kostecki P and Calabrese EJ (eds). IN Diesel Contamination: Analysis, Fate, Environmental and Public Health Effects, Remediation, and Regulation. Fifth Annual Conference on Hydrocarbon Contaminated Soils. September 24-27, 1990, University of Massachusetts, Amherst, MA, USA. Chelsea, MI: Lewis Publishers.

Dragun J, Mason SA, and Barkach JH. 1991. Where do organic chemicals found in soil come from? IN Proceedings of the Conference on Petroleum Contaminated Soils. February 10-12, 1990, Newport Beach, CA, USA. Chelsea, MI: Lewis Publishers.

Barkach JH, Dragun J, and Mason SA. 1991. Pre-acquisition environmental audits. IN Proceedings of the Fourth Annual National Meeting and Conference of the Academy of Certified Hazardous Materials Managers. June 25-27, 1991, Ann Arbor, MI, USA.

Barkach JH, Dragun J, and Mason SA. 1990. Soil and groundwater cleanup standards as approached by the Michigan Department of Natural Resources. Environmental Professional 12:319-333.

Dragun J, Barkach JH, and Mason SA. 1990. Misapplications of the EP-Tox, TCLP, and the CAM-WET tests to derive data on the migration potential of chemicals in soil systems. IN Proceedings of the Fourth Conference on Environmental and Public Health Effects of Soil Contaminated with Petroleum Products. September 25-28, 1989, University of Massachusetts, Amherst, MA, USA. Chelsea, MI: Lewis Publishers.

Jackson DR, Dragun J, Lawrence C, and Lamber K. 1989. A sampling method for preventing cross contamination of soil samples obtained from intact cores. Waste Management 9:37-39.

Publications (Cont'd)

Dragun J and Barkach J. 1989. Three common misconceptions concerning the fate and cleanup of petroleum and its products in soil and groundwater. IN Proceedings of the Third Conference on Environmental and Public Health Effects of Soil Contaminated with Petroleum Products. September 19-21, 1988, University of Massachusetts, Amherst, MA, USA. Chelsea, MI: Lewis Publishers.

Dragun J. 1988. The fate of hazardous materials in soil: Part 3. Hazardous Materials Control 1(5):24-43.

Dragun J. 1988. The fate of hazardous materials in soil: Part 2. Hazardous Materials Control 1(3): 40-65.

Dragun J. 1988. The fate of hazardous materials in soil: Part 1. Hazardous Materials Control 1(2): 30-78.

Dragun J. 1988. Recovery techniques and treatment technologies for petroleum and petroleum products in soil and groundwater. IN Proceedings of the Second Conference on Environmental and Public Health Effects of Soil Contaminated with Petroleum Products. September 28-30, 1987, University of Massachusetts, Amherst, MA, USA. Chelsea, MI: Lewis Publishers.

Dragun J. 1988. Microbial degradation of petroleum products in soil. Calabrese EJ and Kostecki P (eds). IN Soils Contaminated by Petroleum: Environmental & Public Health Effects. New York: Wiley Interscience.

Dragun J. 1986. The soil chemistry of hazardous materials: basic concepts and principles. IN Proceedings of the 7th National Conference on Management of Uncontrolled Hazardous Waste Sites. December 1 - 3, 1986, Washington, D.C. Silver Spring, MD: Hazardous Materials Control Research Institute.

Dragun J, Lewis R, and Murray W. 1986. Impact of soil chemistry on contaminant migration from hazardous waste areas. IN Proceedings of the Eighth Annual Symposium on Geotechnical and Geohydrological Aspects of Waste Management. February 5 - 7, 1986, Colorado State University, Fort Collins, CO, USA. Rotterdam, Netherlands: Balkema Publishers.

Dragun J and Erler TG. 1986. Human Exposure Assessment: Basic elements and applications in engineering remedial actions at sites containing contaminated soil and groundwater. IN Hazardous and Industrial Solid Waste Testing: Fourth Symposium. ASTM STP 886. Philadelphia, PA: American Society for Testing and Materials.

Dragun J, Schneiter RW, and Erler TG. 1985. Cleanup of zinc-contaminated sites: soil chemistry and engineering aspects. IN Hazard Assessment of Chemicals - Current Developments. Volume 4. New York, NY: Academic Press.

Publications (Cont'd)

Schneiter RW, Dragun J, and Kalinowski TW. 1985. A carbon adsorption isotherm test for volatile organic chemicals in water. Journal of the Water Pollution Control Federation 57(5):403-405.

Dragun J and Helling CS. 1985. Physicochemical and structural relationships of organic chemicals undergoing soil- and clay-catalyzed free-radical oxidation. Soil Science 139(2):100-111.

Schneiter RW, Dragun J, and Erler TG. 1984. Groundwater Contamination: 3. Remedial action. Chemical Engineering 91:73-78.

Block RM, Dragun J, and Kalinowski TW. 1984. Groundwater contamination: 2. Health and environmental aspects of setting clean up criteria. Chemical Engineering 91:70-73.

Dragun J, Schneiter RW, and Kuffner AC. 1984. Groundwater Contamination: 1. Transport and transformations of organic chemicals. Chemical Engineering 91:65-70.

Smith LR and Dragun J. 1984. Degradation of volatile chlorinated aliphatic priority pollutants in groundwater. Environment International 10:291-298.

Smith LR and Dragun J. 1984. Comments on peroxy radical interactions with soil constituents. Soil Science Society of America Journal 48:1205-1206.

Erler TG, Dragun J, and Weiden DR. 1984. Two case studies of cost-effective remedial actions for PCB contaminated soil. Proceedings 38th Annual Purdue Industrial Waste Conference. Boston, MA: Ann Arbor Science.

Dao TH, Lavy TL, and Dragun J. 1983. Rationale of solvent selection for soil extraction of pesticide residues. Residue Reviews 87:91-104.

Helling CS, Pillai P, and Dragun J. 1982. Soil-catalyzed oxidation of aniline. Chemosphere 11(3):299-317.

Dragun J and Baker DE. 1982. Characterization of copper availability and corn seedling growth by a DTPA soil test. Soil Science Society of America Journal 46:921-925.

Dragun J and Helling CS. 1982. Soil- and Clay-catalyzed reactions: I. Physicochemical and structural relationships of organic chemicals undergoing free-radical oxidation. IN Proceedings of the 8th Annual Research Symposium. Southwest Research Institute and the U.S. Environmental Protection Agency, Fort Mitchell, KY. Washington, D.C.: U.S. Environmental Protection Agency.

Publications (Cont'd)

Dao TH, Marx DB, Lavy TL, and Dragun J. 1982. Effect and statistical evaluation of soil sterilization of aniline and diuron adsorption isotherms. Soil Science Society of America Journal 46:963-969.

U.S. EPA. 1982. Office of Pesticides and Toxic Substances. Soil Thin Layer Chromatography. Test Guideline #CG-1700. IN Chemical Fate Test Guidelines. EPA 560/6-82-003. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. EPA. 1982. Office of Pesticides and Toxic Substances. Sediment and Soil Adsorption Isotherm. Test Guideline #CG-1710. IN Chemical Fate Test Guidelines. EPA 560/6-82-003. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. EPA. 1982. Office of Pesticides and Toxic Substances. Soil Thin Layer Chromatography. Support Document #CS-1700. IN Chemical Fate Test Guidelines. EPA 560/6-82-003. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. EPA. 1982. Office of Pesticides and Toxic Substances. Sediment and Soil Adsorption Isotherm. Support Document #CS-1710. IN Chemical Fate Test Guidelines. EPA 560/6-82-003. Washington, D.C.: U.S. Environmental Protection Agency.

Helling CS and Dragun J. 1981. Soil leaching tests for toxic organic chemicals. IN Test Protocols for Environmental Fate and Movement of Toxicants. ISBN-0-935584-20-X. Arlington, VA: Association of Official Analytical Chemists.

Dragun J and Helling CS. 1981. Evaluation of molecular modeling techniques to estimate the mobility of organic chemicals in soils: II. Water solubility and the molecular fragment mobility coefficient. IN Land Disposal: Hazardous Waste. Proceedings of the 7th Annual Research Symposium. Southwest Research Institute and the U.S. Environmental Protection Agency, Philadelphia, PA. Washington, D.C.: U.S. Environmental Protection Agency.

Dragun J, Potenzone R, Fowler CS, and Helling CS. 1980. Evaluation of molecular modeling techniques to estimate soil-chemical mobility: I. Molecular connectivity and charge related indices. IN Proceedings of the Research Symposium, 53rd Annual Meeting, Water Pollution Control Federation, Las Vegas, NV. Washington, D.C.: Water Pollution Control Federation.

Dragun J and Baker DE. 1979. Electrochemistry. IN Encyclopedia of Earth Sciences XII: Soil Science. Stroudsburg, PA: Dowden, Hutchinson, & Ross.

Dragun J and Baker DE. 1976. Copper: an analysis of soil and plant relationships. Science in Agriculture 23: 2-3.

Publications (Cont'd)

Dragun J, Baker DE, and Risius ML. 1976. Growth and element accumulation by two single cross corn hybrids (Zea Mays L.) as affected by copper in solution. Agronomy Journal 68: 466-470.

MICHAEL GREGORY SKLASH
EXPERT QUALIFICATIONS

Education

- Ph.D. in Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada, 1978 (specializing in hydrogeology).
- M.Sc. in Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada, 1975, (specializing in hydrogeology).
- B.A.Sc. in Geological Engineering, University of Windsor, Windsor, Ontario, Canada, 1973.

Employment History

- 1992 - present, Senior Hydrogeologist, The Dragun Corporation, Farmington Hills, Michigan
- 2002, Sessional Professor**,** Department of Earth Science, University of Windsor, Windsor, Ontario, Canada
- 1977 - 1994, Professor, Department of Geology and Department of Civil and Environmental Engineering, University of Windsor, Windsor, Ontario, Canada

Professional Registration

- Professional Engineer, Association of Professional Engineers of Ontario, 1979-present

Honors, Awards, & Appointments

- Adjunct Full Professor, Department of Civil and Environmental Engineering, University of Windsor, Windsor, Ontario, Canada, 1994 – 2000.
- Editorial Advisory Board of the Journal Hydrological Processes, 1986 - 1995.

Expert Committee Appointments

- National Hydrology Research Institute, Environment Canada, 1997

- The program committee for the 1991 Gordon Research Conference Hydrological, Geochemical, and Biological Interactions in Forested Catchments; and the American Geophysical Union's 1989 Chapman Conference: Hydrogeochemical Responses in Forested Catchments

- The U.S. Department of Agriculture invited Dr. Sklash to present a state-of-the-science review of groundwater - surface water interactions at their 1991 symposium on water quality modeling held in Logan, Utah.

- Canadian Secretary of State - served as a representative at the International Atomic Energy Agency meeting on The Use of Isotope Techniques in Water Resources Development held in Vienna, Austria in 1991.

International Assistance

- Appointed as a hydrogeological expert to assist the Canadian International Development Agency (CIDA) and the International Development Research Centre (IDRC) in their groundwater investigations in developing countries.

- Examined the groundwater and surface water monitoring network in the Lubombo district of Swaziland and then advised the Swaziland Department of Geological Surveys and Mines and CIDA on a program to assess groundwater contributions to surface water.

- Assessed the hydrogeological framework of the drought stricken Akola Taluka area of Mahrashstra State in India. Advised the IDRC on methods of harvesting rainfall and runoff to supplement existing water resources.

Project Experience - Recent

- Aero-Motive Company, Kalamazoo, Michigan
  litigation support, plume allocation, trichloroethene in groundwater, modeling
- Aerodynamics, Inc., Pontiac, Michigan
  litigation support, LNAPL in groundwater, groundwater remediation, modeling
- Buckingham, Doolittle, & Burroughs, LLP., Columbus, Ohio
  litigation support, impacts from factory farm
- Deffenbaugh Industries, Shawnee, Kansas
  groundwater investigation at landfill, use of isotopes to trace leachate movement
- Delphi Automotive, Flint, Michigan
  peer review, LNAPL investigation, remediation
- Dorinco Reinsurance Company, Timber Insurance Ltd, and Dorintal Reinsurance Ltd
  litigation support, plume allocation, VOCs in groundwater, modeling
- Federal Mogul Corporation, Grand Haven, Michigan

groundwater investigation, plume allocation

- Federal Mogul Corporation, Michigan City, Indiana
  groundwater investigation, groundwater modeling, chlorinated hydrocarbons
- Federal-Mogul Corporation, St Johns, Michigan
  groundwater investigation, aquifer testing, VOCs in groundwater, remediation
- Freedom Hill Park, Sterling Heights, Michigan
  due care analysis of landfill
- Henkel Surface Technologies, Morenci, Michigan
  groundwater flow system analysis, VOCs in groundwater
- Hidden Oak Subdivision, Romeo, Michigan
  groundwater supply
- Hydro Aluminum Adrian, Michigan -
  remedial investigation, plume allocation, modeling, chlorinated hydrocarbons
- Jervis B. Webb Company, Farmington Hills, Michigan,
  forensic hydrogeology, plume allocation, groundwater consulting in South Gate, CA; meetings with California regulators
- Murphy Oil, Minnesota
  BTEX in groundwater, plume allocation
- Pogogeff , Alpine, New Jersey
  litigation support, groundwater level increase
- Rexair, Inc., Cadillac, Michigan
  groundwater investigation, plume allocation, groundwater modeling, chlorinated hydrocarbons
- Rock-Tenn, Otsego, Michigan
  lagoon investigation, chlorinated hydrocarbons
- Schwan's Sales Enterprises Incorporated, Salina, Kansas
  soil and groundwater investigation, plume allocation, VOCs in groundwater
- Seven Lakes Development, Romeo, Michigan
  remedial investigation, groundwater supply, and groundwater modeling
- South Macomb Disposal Authority Sites 9/9A - Superfund Sites, Michigan
  remedial investigation, groundwater modeling, litigation support
- South Macomb Disposal Authority Sites 9/9A - Superfund Sites, Michigan
  Re-Odrobina plume allocation
- South Macomb Disposal Authority Site 11, Michigan
  consulting regarding landfill
- South Minnesota Beet Sugar Cooperative, Minnesota
  groundwater report for NPDES permit
- TRW, Sterling Heights, Michigan
  peer review, LNAPL remediation, flow system analysis
- Tucson Airport Superfund Site, Arizona
  litigation support, groundwater modeling, chlorinated hydrocarbons
- University of Michigan, Ann Arbor, Michigan
  landfill closure, groundwater investigation, chlorinated hydrocarbons
- Unocal, Bellaire, Ohio

litigation support, plume allocation, BTEX in groundwater

- Vesper Construction, Macomb Township, Michigan
  soil and groundwater investigation adjacent to landfill
- Walbro Corporation, France
  peer review, groundwater modeling, chlorinated hydrocarbons

Trial Testimony and Depositions - Recent

- Pogogeff v Borough of Alpine, et al.
  New Jersey
  Docket No. BER-L-735-99

- Aero-Motive Company v. William and Roger Becker
  US District Court, Western District of Michigan
  Case No. 1:99-CV-384 (W.D. Mich.)

- Aetna Casualty and Surety Company v The Dow Chemical Company and American Guarantee and Liability Company, et al.
  US District Court, Eastern District of Michigan, Southern Division
  Case No. 93 CV 73601 DT

- American Special Risk Insurance Company et al. v City of Center Line et al.,
  United States District Court, Eastern District of Michigan, Southern Division
  Case No. 2:97-CV-72874

- South Macomb Disposal Authority v Cranford And International Insurance Company,
  The Circuit Court For The County Of Macomb, State Of Michigan
  Case No. 84-2686-CZ

- Technical Rubber Co. et al. v Buckeye Egg Farm LLP et al.
  Licking County Court of Common Pleas, Newark, Ohio
  Case No. 99 CV 729

- United States Aviation, et al., v Tucson Airport Authority et al.; Ronald John Smith et al., v Tucson Airport Authority et al.; and Associated Aviation Underwriters, et al., v Tucson Airport Authority et al.,
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