

# **Kathryn S. Makeig**

**President**

**Waste Science Inc.**

## **PROFESSIONAL CERTIFICATIONS, AWARDS, CLEARANCES, AND MEMBERSHIPS**

Congressional Science and Technology Fellow – AAAS and AGI 2000-2001  
Certified Professional Geologist #6137 AIPG, 1982  
Certified Geologist #267 Virginia, 1984  
Department of Energy "Q" Security Clearance (inactive) 1998  
Registered Professional Geologist #PG-000783-G Pennsylvania, 1994  
Commissioner- Rockville Science, Technology, and Environment, 1995-1998  
Assoc. of Ground Water Eng. and Scientists, Nat'l Ground Water Assoc. 1979  
Board of Directors, Lambda Bioremediations Systems, Columbus, OH 1998  
Good Neighbor Award, City of Rockville 2003

## **PROFESSIONAL EXPERIENCE**

### **Science and Technology Policy**

- Congressional Science and Technology Policy Fellow with the American Geological Institute through American Association for the Advancement of Science, fellowship was nationally competed, worked as a professional staff member for Congressman Rush Holt, 12<sup>th</sup> District of New Jersey; areas of legislative policy work included energy, environment, transportation, technology, and science; wrote speeches; prepared press releases; wrote legislation, staffed Resources Committee and Subcommittee for National Parks, Recreation and Public Lands and Subcommittee on Forests and Forest Health; prepared strategy to pass legislation; wrote articles on national science and energy policy for sponsor, and government organizations; worked on the campaign.
- Presented policy and fellowship speeches at the annual meeting of AGU in Boston, Foundation dinner for AGI in Denver, U.S. EPA headquarters, U.S. Geological Survey headquarters, Colorado School of Mines, University of Tulsa, and University of New Mexico.
- Prepared legislation on the Office of Technology Assessment (HR 2148 in 107<sup>th</sup> Congress), national energy policy and tracked issues related to science, environment and transportation, including sustainable development.
- Coordinated the anthrax decontamination with House Sargent-at-Arms and U.S. EPA for contaminated House of Representative offices. Reviewed decontamination plans and provided briefings for the staff. Researched mail decontamination options.
- Registered lobbyist for private sector client with Homeland Security software who is interested in obtaining a FEMA earmark. Prepared briefing information, performed Congressional visits, and met with FEMA to generate interest in this product. Project is on-going.

## **Summary of Experience and Accomplishments**

During her 31 years of environmental consulting experience, Ms. Makeig has performed hazardous and solid waste projects for industry and government, on studies as diverse as evaluating hydraulic controls in a bedrock quarry or designing and implementing a pollution prevention program at a major research facility. During this time, she has had an opportunity to participate in projects involving RCRA, CERCLA, TSCA, CWA, CAA, and SDWA. With over two decades of hands-on field experience and seasoning at the highest levels of American industry. Recently Ms. Makeig served on Capitol Hill as a Science and Technology Fellow through the American Association for the Advancement of Science. Ms. Makeig can bring a high degree of credibility and innovation to her work.

## **Education**

M.S., Hydrogeology (minor in Civil Engineering), Univ. of Minnesota, 1978

B.S., Geology, University of Michigan, 1973

### **Site Investigations**

- Lead Hydrogeologist in charge of a feasibility study for ERT, Inc. at Dundalk Marine Terminal in Baltimore, MD a site owned by the Maryland Port Authority; study involves recommending necessary capital improvements to a drainage system to collect more representative samples of stormwater and improvements that will allow the quantification of Cr(VI) loading in harbor from ground water seepage and tidal fluctuations.
- Project Manager for a water quality sampling project for the US Senate; sampling over 700 locations in the Senate office buildings for lead in drinking water.
- Responsible professional in charge of over 50 site investigations in the U.S. and abroad, with environmental contamination in soils, bedrock, ground water, and surface water; contaminants included PCBs, metals, volatile organics (DNAPLS and LNAPLS), petroleum produces, and pesticides.
- Provided technical support to DOE Headquarters for Brookhaven National Laboratory and the ground water/vadose zone initiative at Hanford in Richland, Washington. Support includes review and comment on documents and formulation of success strategy, close interface with stakeholders.
- Contributed to a Remedial Action Plan and hydraulic field testing for a former waste burial site the DOE Pinellas Plant in Largo, Florida. Work involved the interpretation of nine years of geologic, hydraulic, and chemical data associated with an unconsolidated, heterogeneous shallow aquifer with up to one million parts per billion volatile organic compounds in the ground water.
- Performed and managed drilling, test trenching, geophysical surveys, geologic mapping, building material sampling and concrete coring, surface water sampling, lysimeter installation, pump test analysis, ground water modeling, and the installation of over 500 monitoring wells. Performed one of the first site investigations for dense chlorinated solvent in ground water for Disston Tools in Danville, Virginia in 1980. Managed some of the first site investigations after the promulgation of RCRA regulations.
- Managed site assessments related to divestitures and acquisitions; at one time fielded 10 teams out of six offices to perform an assessment that included chemical sampling and analysis and produced reports documenting potential environmental liability within the three-week deadline mandated by the client for settlement.
- Senior hydrogeologist of a major study at Edgewood Arsenal - Edgewood, Maryland for DoD DSHE. The study involved an RI/FFS regarding the impact of solvent-based clothing impregnation operations. Over 25,000 µg/L DNAPLs were found on a peninsula in a tidally-controlled, unconfined and semi-confined aquifer in the Atlantic Coastal Plain. Solutions involve evaluation of ACL demonstration and Technical Impracticability Waiver strategies.

### **Site Remediation**

- Designed and implemented an in-situ bioremediation demonstration at the Naval Supply Center in Mechanicsburg, PA for the US Navy and EA Engineering; project involved treatment of 1.5 acres of drainage ditch contaminated with pesticides, PCBs, petroleum, PAHs, and heavy metals; reductions in all components except arsenic were observed after only 15 weeks.
- Designed and implemented an in-situ biotreatability study at a test plot on Mahoning River in eastern Ohio for Eastgate Regional Council of Governments and USACE Pittsburgh District. Contaminants were heavy metals, PCB's, PAH's, pesticides, and petroleum in river and bank sediments. Interim sampling has revealed 77% to 92% reduction in major contaminants, including Arochlor 1260 and PAHs, in only six weeks.

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- Designed and programmed statistical toolbox for Brookhaven National Laboratory, Waste Management Division; based on SW-846 and MARSSIM methods; purpose was to provide statistically-valid sampling method for bulk waste characterization to ensure that future waste shipments would not be rejected by mixed waste disposal facility based on their waste acceptance criteria; toolbox allowed field personal to analyze waste concentrations using Excel-based program, based on confidence intervals, administrative limits, budget, Data Quality Objectives, and stakeholder-defined objectives.
- Deputy Project Manager for the environmental support contract under Systematic Management Services, Inc. in support of DOE EM-40 for the northwestern region.
- Performed biotreatability study and made remedial action recommendations for the cleanup of a No. 2 fuel oil spill in Odenton, Maryland for International Paper Company. Site samples were evaluated in the laboratory and a microbial profile of indigenous microbes was compiled in a treatability study.
- Designed, installed, and operated the bioremediation of semi-volatiles organics (particularly benzo(a)pyrene) found in soils under a building floor during a voluntary action investigation in Ohio. Client specified that cleanup must be low cost, non-disruptive, and relatively passive so the building could be occupied as soon as possible. Within the first month, SVOC levels in the soils were shown to be decreasing. Cleanup was completed within 24 months while building was occupied.
- Responsible professional in charge of 15 site cleanups under RCRA and CERCLA; cleanup technologies included ground water extraction and carbon treatment, ground water extraction and air stripping, chemical precipitation, soil excavation, incineration, and chemical and physical stabilization.
- Prepared site remediation work plans and directed detailed cost estimates, bid plans and specification preparation, bid solicitation, and general contracting for site cleanup. Initiated and directed formal panel discussion for a major client regarding innovative applications of engineering technology, including thermal treatment, biological treatment, chemical oxidation, use of surfactants, containment technologies, and in-situ treatment.
- Managed the removal of over 30 underground storage tanks containing petroleum products, waste chemicals, raw chemical products, and tainted washwater. Remediated the resultant impacts from those found to be leaking.
- Managed the emergency cleanup of a large, 11-machine, die cast department contaminated with PCBs, including identification of sources, sampling, floors, machine surfaces, waste products, and venting system, and power cleaning all equipment in two weeks without the loss of a single hour of plant production.

**Forensic Studies and Expert Witness**

- Expert witness at adjudicatory hearing in July 2003 for citizens group Citizens for Adequate School Facilities (CASF) regarding the appropriateness of Maryland Department of the Environment (MDE) and Howard County School Board installing a large septic system at a proposed high school in Howard County, Maryland. Issues included controlling high nitrate concentrations, impact on adjacent wetlands, adequacy of permit conditions, adequacy of the percolation testing, and impact on domestic supply wells in the area.
- Hydrogeologist for a study to evaluate the impact of the 1993 Mid-west floods on structural and future settlement damages resulting from inundation of a manufacturing facility along the Missouri River. Evaluation involved a review of existing subsurface hydrogeologic and hydrologic data and prediction of most probable past and future events based on limited evidence. Saved over \$40 million in insurance claims.

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- Hydrogeologist for underground storage tank failure and soil piping associated with cable placement for the investigation of insurance claims.
- Hydrogeologist for sewer erosion and sinkhole development associated with damaged sewer for investigation of insurance claims.
- Hydrogeologist for parking lot failure analysis using subsurface drainage system for investigation of insurance claims.
- Expert witness for \$2 million claim against well driller that involved research and trial testimony before a jury regarding geology and hydraulic principles in the complex setting of Valley and Ridge province of Morgan County, West Virginia (eastern panhandle). The trial was successful for the defendant, for whom expert testimony was provided.

**Quality Engineering and Pollution Prevention**

- Senior technical support for Department of Energy Headquarters Environmental Management group regarding the restoration of Hanford site in Richland, Washington. Duties involved review of complex technical documents, participation in strategy meetings, interfacing with concerned and sometimes hostile stakeholders, composing letters from senior DOE staff, and advising senior staff on planning and implementation of technical programs for site cleanup and stewardship.
- For the Analytical Services Division of DOE, Ms. Makeig helped evaluate the use of Data Quality Objectives by EM at 10 locations. Projects involve environmental restoration, technology development, and decontamination and decommissioning (D&D). DQOs were used to perform data collection and evaluated whether it has streamlined the process and saved DOE money over more conventional approaches.
- Authored a Waste Minimization/Pollution Prevention Plan for research and development laboratories at Battelle Memorial Institute in Columbus, Ohio. Included were instructions on establishing a pollution prevention program, formulating a task force, source reduction, and recycling. Special activities associated with the variety of chemicals and the unusual waste streams generated by research were addressed.

**Compliance and Training**

- Performed technical and field staff training for WSI-developed statistical sampling Toolbox at Brookhaven National Laboratory; developed Guidance Document to help with sampling design to decrease likelihood of rejected waste shipments at disposal facility.
- Performed compliance training and environmental audit for St. Louis Job Corps Center; addressed Notice of Violations from past improper management and made recommendations for the proper management of hazardous materials and storage and disposal of RCRA and TSCA wastes.
- Presented training for Government Institutes Environmental Laws and Regulations Compliance course on the Toxic Substance Control Act, new manufacturer notifications, import/export rules, and PCB management and cleanup.
- Developed and presented portions of a course presented multiple times for the DOE Headquarters EH-33 staff and Field Managers to comply with HAZWOPER training in compliance with OSHA 1910.120.
- Served as environmental consultant for major industrial client, including training their staff at national waste seminars, writing standard operating procedures for acquisitions and divestitures, performing emergency response, performing indoor air monitoring, providing emergency industrial hygiene services, and working with attorneys to establish program to address environmental compliance at over 200 facilities.

- Managed environmental compliance and waste management task for Battelle Memorial Institute in Columbus, Ohio to address audit compliance issues. Wrote a policy on managing empty chemical containers, including those for infectious, PCB, hazardous, mixed, and radiological wastes and raw products. Authored two Spill Prevention, Control, and Countermeasures Plans for their two Ohio campuses.

### **Solid Waste**

- Project Manager for Montgomery County, MD solid waste recycling practices for small businesses; supervised the calling of 1000 small businesses in the County to document their recycling practices and identify those that were using unlicensed haulers/collectors/processors; input data into database and analyzed the recycling practices that quantified the amount of recycling that was not accounted for in the County's records.
- Project Director for Montgomery County, MD solid waste recycling study of small quantity generators; study involved surveying 1000 small businesses in the County to identify those who use unlicensed haulers/collectors or processors in an attempt to quantify the volume of recycling that was unaccounted for in the County's records.
- Project Manager for Montgomery County, MD solid waste generation and sorting study involving field measurements of waste, volume estimates of 52 waste categories, and extensive phone survey of waste generation practices.
- Project Manager for hydrogeologic study of baled waste landfill in bedrock quarry. Design required extensive detailed geologic mapping of quarry and installation of two dozen monitoring wells. Led field mapping effort. Analysis involved exerting hydraulic controls on future leachate generation, as the waste would be 200 feet below water table.
- Project Manager for installation of lysimeters to study impact of spray irrigation of municipal sewage sludge on chemical quality of agricultural land. Also managed 13 studies for evaluating the feasibility of entrenchment of domestic sewage sludge on agricultural land. This study involved design of a natural buffer for sludge leachate stabilization.

### **Foreign Experience**

- Performed as lead hydrogeologist for study in Medellin, Colombia, regarding leachate generation and discharge to a river from a solid waste landfill and Rio Medellin pollution as a result of river dumping.
- Program Manager in Radian's Toronto office; hired local staff for projects in Ontario and Alberta, Canada.
- Managed site investigation of the solid and hazardous waste concerns associated with the Dew Line project for the early alert radar stations in the High Arctic of Canada; study included landfill containment in the permafrost and logistical support.

### **Research and Design**

- Designed Excel<sup>TM</sup>-compatible software to help field personnel and managers design and evaluate sampling data for large-scale data collection projects; software uses SW-846, ASTM and MARSSIM statistical approaches along with Data Quality Objectives error evaluation and quantification with a sampler-controlled set of input parameters. This software will help evaluate correct number of samples to collect for various levels of confidence and acceptable errors and will allow evaluator to compare results against a standard to see if material exceeds sampler-specified threshold.

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- Designed and performed a large-scale pump test in a buried bedrock valley in downtown Minneapolis, Minnesota for the dewatering of a large-diameter sewer tunnel beneath city. Involved the installation and monitoring of 23 observation wells and pumping wells in alluvial fill and solutioned limestone bedrock; part of this grant involved the publication of a "how to" book for the department on conducting a pump test.
- Researcher in the area of soil and rock engineering research for IITRI. Geologist for the study of the use of utility tunnels associated with underground construction projects; involved an analysis of construction sequence of a variety of subway projects in major cities. Geologist for study of a soil stress measurement gage; the study involved the design, fabrication, and testing of a bi-axial stress gage made from an aluminum cylinder and rubber membranes in a pressurized cubic foot of soil.

**PROFESSIONAL POSITIONS**

President, Waste Science Inc.	1993-2000 and 2002-Present Rockville, Maryland
Congressional Science and Technology Fellow, AAAS and American Geological Institute Congressman Rush Holt (12 <sup>th</sup> - NJ)	2000-2002 Washington, D.C.
Corporate Technical Director, Apex Environmental, Inc.	1992-1993 Rockville, Maryland
Senior Program Manager, Radian Corporation	1986-1992 Herndon, Virginia
Hydrogeologist, Woodward-Clyde Consultants	1983-1986 Rockville, Maryland
Principal Investigator, Dames & Moore	1979-1983 Bethesda, Maryland
Hydrogeologist, Barr Engineering Company	1977-1979 Minneapolis, Minnesota
<u>Other Employment:</u>	1974-1977
Governor's Intern, Minnesota Department of Transportation	St. Paul, MN
Research Assistant, Minnesota Geological Survey	St. Paul, MN
Geologist, Sargent and Lundy Engineers	Chicago, IL
Researcher, Illinois Institute of Technology Research Institute (IITRI)	Chicago, IL

**PUBLICATIONS AND PRESENTATIONS**

*Field-Scale In-Situ Bioremediation of PCBs, Pesticides and Metals in Sediments*, with W.A. McIlvride, J. Davison, S. Jones, and K.T. Sharpe, Eighth International In-Situ and On-Site Bioremediation Symposium, Baltimore, MD, June 6-9, 2005.

*In-Situ Biotreatability Demonstration Using Microbial Consortia for Mahoning River Remediation*, with J. Davison, B.E. Cook, S. Jones and J. Ford, Eighth International In-Situ and On-Site Bioremediation Symposium, Baltimore, MD, June 6-9, 2005.

*Environmental Stewardship*, Public presentation and discussion for church retreat, April 2005.

*Regulatory Mandates for Controls on Ground Water Monitoring*, Chapter One, with D.M. Nielsen, Practical Handbook of Ground Water Monitoring, (ISBN:1-56670-589-4) Lewis Publishing Co., Second edition, 2005.

*Funding the Future: Setting Our S&T Priorities*, from *Technology in Society*, Elsevier Science Ltd., 2002.

*Anthrax in the House*, Geotimes, February 2002.

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- Scientist as Lobbyist*, National Ground Water Association, Annual National Meeting Workshop, Nashville, TN, December 7, 2001.
- Reviving the Office of Technology Assessment*, Geotimes, October 2001.
- National Energy Policy: Another Cold Winter?*, presentation through the American Geological Institute to Department of Geology, University of Tulsa, March 2001, and the Department of Geology and Planetary Science, University of New Mexico, October 2001, Colorado School of Mines, February 2002.
- Energy and Responsibility: The Buck Stops Here*, Geotimes, July 2001.
- Scientist as Policy Maker*, Geotimes, January 2001.
- Fast-Track Bioremediation with Indigenous Microbes*, with J. Davison and K. Suomela, presentation to Department of Energy Technical Information Exchange, October 1999, University of Tulsa, March 2001.
- Plan to Get the Data You Need: Use DQOs*, The Professional Geologist: Hydrogeology - Part 2, American Institute of Professional Geologists, August 1995.
- What to Do with Research Wastes*, Twelfth Annual College and University Hazardous Waste Conference, Baltimore, Maryland, August 7-9, 1994.
- The Versatile Hydrogeologist*, The Professional Geologist: Hydrogeology - Part 1, American Institute of Professional Geologists, July 1994.
- Regulatory Mandates for Controls on Ground Water Monitoring*, Chapter One, from D.M. Nielsen, *Practical Handbook of Ground Water Monitoring*, Lewis Publishing Co., First edition, 1991.
- Assessment and Remediation of Volatile Organic Compounds in a Shallow, Alluvial Aquifer*, with G.R. Chirlin, National Water Well Sixth National Symposium and Exposition on Aquifer Restoration and Ground Water Monitoring, Ohio State University, May 19-22, 1986.
- Multi-Level Lysimeter Monitoring at a Municipal Sludge Spreading Site*, with D.J. Riddle, National Water Well Association Conference on Characterization and Monitoring of the Vadose (Unsaturated) Zone, December 8-10, 1983.
- Natural Buffers for Sludge Leachate Stabilization*, Fifth Annual Conference of Applied Research and Practice on Municipal and Industrial Waste, University of Wisconsin, September 22-24, 1982.
- Natural Buffers for Sludge Leachate Stabilization*, Ground Water, Vol. 20, No. 4, July-August 1982.
- Soil Thermal Factors for Future Generation Cables*, with M.D. Maloney, in Proceedings, Symposium on Underground Cable Thermal Backfill, Electrical Power Research Institute, September 1981.
- Suitability of Contaminant Soils for Attenuating Sludge Leachate*, Proceedings, Symposium on Evaluation of Health Risks Associated with Animal Feeding and/or Land Application of Municipal Sludge, University of Florida, U.S. EPA, April 1980.
- Hydrogeological Evaluation of a Drift-filled, Buried Bedrock Valley in Northern Minneapolis by Means of a Pumping Test and Finite Element Model*, Master's Thesis, University of Minnesota, 1978.
- Design, Implementation, and Operation of a Pumping Test*, Minnesota Department of Transportation, 1977.
- Combined Utility/Transportation Tunnel Systems: Economic, Technical, and Institutional Feasibility*, with P.J. Huck, M.N. Iuengar, and J. Chipps, U.S. Department of Transportation, DOT-TSC-794, August 1975.