

ATUL M. SALHOTRA, PH.D.

RAM Group, Inc.
5433 Westheimer, Suite 725 ▪ Houston, TX 77056
Tel: (713) 784-5151 ▪ Fax: (713) 784-6105
asalhotra@ramgp.com

AREAS OF EXPERTISE

Exposure and risk assessment
Multimedia environmental modeling
Site characterization and remediation
Statistical analysis
Contaminant fate and transport modeling
Regulatory interaction/ negotiation
Training (Consultants, Regulators, & Responsible parties)
Communication with stakeholders

EDUCATION

1985 Ph.D., Massachusetts Institute of Technology, Cambridge: Water Resource Systems and Environmental Modeling
1981 M.Eng., Asian Institute of Technology, Bangkok, Thailand: Water Resources Development
1979 B.Tech., Indian Institute of Technology, New Delhi, India: Civil Engineering
1990 Executive Enterprises, Inc.: "Environmental Regulation Course"
1987 National Water Well Association, "Fluid Flow in Fractured Rocks,"
1986 New York University: "Summer Institute in Risk Management in Environmental Health and Protection"
1983 Colorado State University: "Flood Predictions Estimation and Forecasting"

EMPLOYMENT

1995-Present Risk Assessment and Management, Founding President
1997-Present Technical Consultant, Fanning, Phillips & Molnar
1986-1995 Woodward-Clyde Consultants, Vice President and Principal
1981-1985 Massachusetts Institute of Technology, Research Assistant
1980-1981 Asian Institute of Technology, Research Associate
1979-1980 Gilcon India Ltd., New Delhi, India, Junior Engineer
1978-1979 Rodio & Hazrath Engineers and Contractors, Bombay, India, Trainee Engineer

AFFILIATIONS

American Society of Civil Engineers
Association of Groundwater Scientists and Engineers
American Geophysical Union
Society for Risk Assessment
National Water Well Association (NWWA)

- 1994-present Member, Advisory Committee for Electronically Delivered Hazardous Materials Management Certificate Program, Center for Media & Independent Learning, UC Berkeley
- 1989-present National Ground Water Association, Instructor, Principles of Subsurface Contaminant Fate and Transport Modeling, and Statistical/ Geo-statistical Analysis; Environmental health Risk assessment
- 1994-1996 Member, Advisory Committee, University of California's Nationwide Electronically Delivered Hazardous Materials Management Program
- 1989-1991 Member, Advisory Board, Certificate Program in Hazardous Materials Management, University of California Berkeley Extension,
- 1989-1992 Superfund, HMCRI's 10th, 11th, and 12th National Conference and Exhibition. Post Conference Seminar Instructor "Application of Risk Assessment for Environmental Decision Making"
- 1986-1991 UC Berkeley Extension Program, Instructor, Quantitative Techniques in Risk Assessment, Introduction to Contaminant Fate and Transport Modeling
- 1989-1991 University of San Francisco, Part-time Instructor, Toxicology and Risk Assessment, and Intermedia Pollutant Transport
- 1994-1996 Member, Advisory Committee, University of California's Nationwide Electronically Delivered Hazardous Materials Management Program

CURRENT REGISTRATIONS/CERTIFICATIONS

Certified Trainer, Risk-Based Corrective Action, American Society for Testing and Materials
LPST Corrective Action Project Manager (CAPM 00696)

PROFILE OF PROFESSIONAL ACTIVITIES

Dr. Salhotra combines a background in civil engineering and management with expertise in multimedia environmental modeling, environmental data interpretation, exposure and risk assessment, statistical analysis, site characterization & remediation, and continuing education. His specific project experience includes:

- Assisting 12 states in the development of risk-based corrective action programs involving the development of guidance documents, software, and training of regulatory personnel in risk assessment and fate and transport modeling. Completed the development in Idaho, Alabama, Nebraska, Kansas, Washington DC, and Oklahoma.
- Project manager for about 100 leaking underground storage tank risk assessment in several states.
- Lead trainer for risk-based decision making for several state agencies, including Alabama, California, Georgia, Idaho, Illinois, Kansas, Nebraska, New York, Oklahoma, Texas, and Virginia. Over 4000 professionals have attended Dr. Salhotra's courses.
- Litigation support at a variety of hydrocarbon and solvent impacted sites. Several of these were highly visible cases with considerable public and media scrutiny.

- Project coordinator for the development of an exposure/risk assessment decision support system for API for managing subsurface hydrocarbon contamination.
- Contaminant fate and transport and groundwater modeling for TEXTIN Superfund site.
- Project manager for baseline public health risk assessment for the Superfund site at Lawrence Livermore National Laboratory. Probabilities associated with best and conservative estimates of excess individual cancer risk were evaluated using fate and transport model and Monte Carlo simulation technique.
- Performed and supervised screening level and detailed risk assessments for several property transactions, remedial investigation and feasibility studies, and environmental impact assessments, including the selection and applications of numerical as well as analytical fate and transport models for a variety of site characterization and remediation projects.
- Task leader for groundwater flow modeling to estimate system yields and flow characteristics of a 450-square-mile virgin basin in Nevada. Supervised the selection of a numerical model, and parameters, model calibration, verification, and application.
- Task leader for risk and endangerment assessment for RI/FS investigations at a defense depot.
- Task Manager for preparation of Hydrologic Detection Monitoring Plan for Class I RCRA Part B permit application for the Casmalia Resources hazardous waste management facility. Supervised the design of the monitoring network for the unsaturated zone, saturated zone, and surface water, as well as selection of appropriate statistical techniques for data analysis.
- Developed, documented, and tested a unified multimedia (ground, surface, and air) mass transport model to evaluate land disposal of hazardous waste for the EPA including a generic pre- and post-processor for Monte Carlo analysis that can be conveniently linked to any fate and transport model to conduct uncertainty analysis.
- Developed a water treatment model for exposure assessment. Responsibilities included project management; development of state-of-the-art algorithms to simulate the removal efficiencies of various water treatment processes.
- Provided technical and management support to EPA Office of Solid Waste for the use of models for saturated and unsaturated zone flow and transport.
- Investigated alternative schemes for the disposal of ballast water for the Aleyeska Pipeline Service Company in Port Valdez, Alaska. Responsibilities included analysis of data collected during dye study; analysis of the diffuser hydraulics; analysis of near field and far field mixing using numerical models; and assessment of various schemes to improve mixing.
- Performed technical analysis for cold-water feasibility study for PG&E's Rock Creek-Cresta Project, using dynamic hydro-thermal models: fully mixed and one-dimensional, including wind mixing.
- Prepared a state-of-the-art report on electricity generation from salt gradient solar ponds for the Electric Power Research Institute, U.S.A.

- Developed a hydro-thermal model to simulate the vertical stratification in saline lakes. Performed detailed analysis of surface mass and energy fluxes including the effect of salinity on evaporation. The model was used to estimate optimum inflow rates for the Mediterranean-Dead Sea Hydropower Project, Israel.
- Conducted economic and technical feasibility studies of solar pond potential in Egypt, for the U.S. Agency for International Development, supplemented with extensive travel for site selection.
- Assisted in the development of the MIT Solar Pond Model.
- Developed a numerical hydro-thermal model to analyze the technical feasibility of the Qattara Hydro-Solar Power Project for the U.S. Agency for International Development.
- Participated in a multi-disciplinary study for the Sukothai Groundwater Development Project in Thailand, to assess the economic, social and technical impact of a new well field.
- Assisted in the preparation of the final report of the Bangkok Metropolitan Groundwater Management and Subsidence Studies.
- Conducted extensive training for TNRC LPST and Industrial Hazardous Waste Programs.

HONORS AND AWARDS

Young Professional Award, Woodward-Clyde Consultants, 1988
Best Paper Award at the 4th Congress APD-IAHR, Chiang Mai, Thailand, September 9-13, 1984
Fellowship from His Majesty the King of Thailand, A.I.T., 1979-1981
Gold Medal, Institution of Engineers, India, 1979

PUBLICATIONS **(Selected Reports)**

Risk-Based Decision Making For Petroleum Releases At Underground UST Sites in Indian Countries, Guidance Manual. Report prepared under a cooperative agreement between the American Society for Testing and Materials (ASTM) and the United States Environmental Protection Agency (EPA). March 1999.

ARBCA: Alabama Risk-Based Corrective Action for Underground Storage Tanks, Guidance Manual. Report prepared for the Groundwater Branch, Alabama Department of Environmental Management, Montgomery, AL. April 1998.

RBCA Guidance Document For Petroleum Releases. Report prepared for State of Idaho Division of Environmental Quality Remediation Bureau by Risk Assessment and Management Group, Inc. November 1996.

Risk Based Corrective Action Guidance Document. Report prepared for the Oklahoma Corporation Commission by Risk Assessment and Management Group, Inc. October 1996.

Site Closure Guidance For Petroleum Impacted Sites. Report prepared for New York State Department of Environmental Conservation by Risk Assessment and Management Group, Inc. October 1996.

Guidance Manual For Risk Assessment (RG-91). Report prepared for Texas Natural Resource Conservation Commission (TNRCC) by Woodward-Clyde Consultants. May 1994.

Documentation For API's Decision Support System For Exposure And Risk Assessment. Report prepared for American Petroleum Institute. July 1992.

Application Of Monte Carlo Simulation To Estimate Probabilities Of Human Health Risks Due To VOC Uptake At Selected Locations. Prepared for Lawrence Livermore National Laboratory, CA. 1989.

User's Manual For EPACML Code. Report prepared for U.S. EPA Office of Solid Waste, Washington, D.C. March 1988.

A Generic Monte Carlo Simulation Shell For Uncertainty Analysis Of Contaminant Transport Model. Internal Woodward-Clyde report. February 1988.

Hydrologic Detection Monitoring Plan. Casmalia Resources Hazardous Waste Management Facility. Prepared for Casmalia Resources, January 1988.

Multimedia Exposure Assessment Model For Evaluating The Land Disposal Of Hazardous Wastes, Vol. I. Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory Office of Research and Development. U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1988.

Multimedia Exposure Assessment Model For Evaluating The Land Disposal Of Hazardous Wastes, Vol. II (with P. Mineart). Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory Office of Research and Development. U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1988.

Background Document For Unsaturated Zone Flow And Transport Module Of EPACML. Report prepared by Woodward-Clyde Consultants for Office of Solid Waste. U.S. Environmental Protection Agency, Washington, D.C. Contract No. 68-03-6304. 1988.

Background Document For EPA's Composite Landfill Model (EPACML). Report prepared by Woodward-Clyde Consultants for Office of Solid Waste. U.S. Environmental Protection Agency, Washington, D.C. Contract No. 68-03-6304. 1988.

A Monte Carlo Simulation Shell For Uncertainty Analysis (with R. Schanz and P. Mineart). Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1988.

- Enhanced Methods For Characterizing Uncertainties In Numerical Models; Volume I: Methodology Development And Validation* (with R. Kulkarni, G. Luster, and G. Rao). Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory Office of Research and Development. U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1988.
- Enhanced Methods For Characterizing Uncertainties In Computationally Intensive Models; Volume II: User's Manual And Programmer's Guide* (with R. Schanz, G. Rao, and R. Kulkarni). Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory Office of Research and Development. U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1988.
- Contaminant Transport From Subtitle D Facilities: Sensitivity Analysis Using The Multimedia Model.* Report prepared for U.S. EPA Office of Solid Waste, Washington, D.C. September 1987.
- A Water Treatment Plant Model For Pollutant Exposure Assessment,* (with R. Schanz). Report prepared by Woodward-Clyde Consultants for Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. September 1987.
- Contaminant Transport From Subtitle D Facilities: Sensitivity Analysis Using The Multimedia Model* (with others). Report prepared by Woodward-Clyde Consultants for Office of Solid Waste. U.S. Environmental Protection Agency, Athens, GA. Contract No. 68-03-6304. 1987.
- A Probabilistic Methodology For Analyzing Water Quality Effects Of Urban Runoff On Rivers And Streams.* Report prepared by Woodward-Clyde Consultants for Office of Water, U.S. Environmental Protection Agency, Washington, D.C. Contract No. 68-C8-0034.
- A Coupled Heat, Salt And Water Balance Model Of Evaporation And Stratification In Saline Terminal Lakes: An Application To The Dead Sea.* Ph.D. Thesis, M.I.T., Department of Civil Engineering, February 1986.
- A User's Manual For The Massachusetts Institute Of Technology Solar Pond Program (Mitsol)* (with J. Atkinson, E.E. Adams, and D.R.F. Harleman). Ralph M. Parsons Laboratory, Department of Civil Engineering, M.I.T., October 1983.
- Modeling The Vertical Mixing In The Dead Sea: Progress Reports No. 1-8* (with E.E. Adams and D.R.F. Harleman). Ralph M. Parsons Laboratory, Department of Civil Engineering, M.I.T., January 1983.
- Solar Pond Feasibility Study For Egypt - Preliminary Report* (with E.E. Adams and D.R.F. Harleman). Technical Report No. 288, Ralph M. Parsons Laboratory, Department of Civil Engineering, M.I.T., September 1982.
- Mass Transport Of Solutes In Saturated Porous Media Flow: Analytical And Numerical Study.* M.Eng. Thesis, Asian Institute of Technology, Thailand, 1981.

Papers

The Application of TPH Within the Risk Based Decision Making Framework-a Nationwide Survey, 1999 Petroleum Hydrocarbons and Organic Chemicals in Groundwater, Prevention, Detection and Restoration. Paper presented at the National Groundwater Association Conference.

Evaluation of Indoor and Outdoor Inhalation Pathway with the RBCA Tiered Approach, paper presented and included in the proceedings for the 1998 Petroleum Hydrocarbons and Organic Chemicals in Groundwater, Prevention, Detection and Restoration. Paper presented at the National Groundwater Association Conference, November, Houston, TX.

Development and Implementation of ARBCA (Alabama Risk Based Corrective Action) Program, co-author of paper in the proceedings for the 1998 Petroleum Hydrocarbons and Organic Chemicals in Groundwater, Prevention, Detection and Restoration. Paper presented at the National Groundwater Association Conference, November, Houston, TX.

Customized RBCA Programs, Paper presented at the 1997 Petroleum Hydrocarbons and Organic Chemicals in Groundwater, Prevention, Detection and Restoration. Paper presented at the National Groundwater Association Conference, November, Houston, TX.

Lessons Learned from Application of RBCA at Multiple Sites, Invited Speaker 1996 Petroleum Hydrocarbons and Organic Chemicals in Groundwater, Prevention, Detection and Restoration. Paper presented at the National Groundwater Association Conference, November, Houston, TX.

An Exposure and Risk Assessment Decision Support System poster presentation, Society of Toxicology, March 16-18, 1993, New Orleans, LA

An Exposure/Risk Assessment Tool for UST Sites: The API Decision Support System. Paper presented at the Water Environment Federation Conference, "How Clean is Clean," January 1993, Washington, D.C.

Evaluation of the Rackwitz-Fiessler Uncertainty Analysis Method for Environmental Fate and Transport Models (with R. W. Schanz). Water Resources Research, April 1992.

Development of Risk-Based Clean-up Levels using Fate and Transport Models. Paper presented at the Eighth Annual Hazmacon, April 15-18, 1991, Santa Clara, California.

Application of Monte Carlo Simulation to estimate probabilities of exposure and human health risk, National Research and Development Conference on the Control of Hazardous Materials. February 20-22, 1991, Anaheim, California.

Estimating Cleanup Levels at Hazardous Waste Sites. Paper presented at the Superfund 1990 Conference in Washington, D.C.

A Monte Carlo Approach to Exposure Assessment. Paper presented at the 1990 Environmental Engineering ASCE Specialty Conference, Arlington, Virginia.

- A Subsurface Contaminant Transport Model for Exposure Assessment from Landfills* (with Phillip Mineart). Paper presented at Twelfth Annual Madison Waste Conference. September 20-21, 1989. Madison, WI.
- Estimation of Infiltration Rates From a Landfill* (with Y.J. Meeks and G. Palhegyi). Paper presented at ASCE/NCEE Conference, July 10-12, 1989. Austin, TX.
- Risk Based Approach to Evaluation of Groundwater Contamination From Land Based Waste Disposal* (with L.A. Mulkey and L. Brown). Paper presented at the 1988 Joint CSCE-ASCE National Conference on Environmental Engineering, July 13-15, 1988. Vancouver, B.C.
- Improving The Efficiency of Monte Carlo Simulation For Groundwater Transport Models* (with D. Veneziano, R. Kulkarni, and G. Luster). Proceedings of the conference on geostatistical, seismicity, and uncertainty methods for groundwater flow and radionuclide transport modeling. pp.155-172. Paper presented at the DOE/AECL Conference, September 15-17, 1987. San Francisco, CA.
- Evaporation From Saline Water Bodies*. Paper presented at the Seventh Annual Hydrology Days. April 21-23, 1987. Colorado State University Fort Collins, Colorado.
- A Multimedia Exposure Assessment Model For Evaluating Land Disposal of Hazardous Wastes*. Report prepared for U.S. EPA Office of Research and Development, Athens, Georgia, February 1987.
- Vertical Mixing in Thermohaline System* (with E.E. Adams and D.R.F. Harleman). Ralph M. Parsons Laboratory, Department of Civil Engineering, M.I.T. Paper presented at the Third International Symposium on Stratified Flows, Pasadena, California, February 1987.
- Exposure Assessment For The Pesticide Aldicarb in Florida, USA* (with J.D. Dean and E.W. Strecker). Proceedings of an International Conference on the Vulnerability of Soil and Groundwater to pollutants. Noordwijk aan Zee, The Netherlands. 1987.
- The Alpha, Beta, Gamma of Evaporation From Saline Water Bodies* (with E.E. Adams and D.R.F. Harleman). Ralph M. Parsons Laboratory, Department of Civil Engineering, M.I.T. Submitted to Water Resources Research, October 1986.
- Effect of Salinity and Ionic Composition on Evaporation* (with E.E. Adams and D.R.F. Harleman). Water Resources Research, September 1985.
- A Numerical Model For The Annual Operation Of A Salt Gradient Solar Pond* (with E.E. Adams and D.R.F. Harleman) Invited speaker, U.S. delegation to the U.S.-India Binational Symposium on Solar Energy, Roorkee, India, August 9-11, 1985.
- Annual Cycles In The Operation Of A Salt Gradient Solar Pond* (with E.E. Adams and D.R.F. Harleman). In Proceedings of the 1985 Solar Energy Conference, March 19-21, 1985, Knoxville, Tennessee (Paper included in conference proceedings).
- Evaporation And Stratification Study For The Dead Sea* (with E.E. Adams and D.R.F. Harleman). In Proceedings of the Fourth Congress of the Asia and Pacific Division IAHR, September 9-13, 1984, Chiang Mai, Thailand.

Mathematical Simulation Of Evaporation, Salinity And Temperature For The Hydroelectric Project At The Qattara Depression, Egypt (with E.E. Adams and D.R.F. Harleman). XX IAHR Congress, Moscow, USSR, September 1983.

Mixing In The Epilimnion Of The Dead Sea (with E.E. Adams and D.R.F. Harleman). Annual Conference ASCE Hydraulics Division, M.I.T., Cambridge, August 1983.