

DAVID BACK, HYDROGEOLOGIST

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EDUCATION

- M.S., Geology (hydrogeology concentration), Oklahoma State University, Oklahoma, 1986.
- B.S., Geology, College of William and Mary, Virginia, 1981

CERTIFICATION AND TRAINING

- OSHA 29 CFR 1910.120 40-Hour Hazardous Waste Training (includes Level C training/respirator fit-tested and qualified).
- OSHA 8-Hour Refresher Training.
- First Aid/CPR

AREAS OF EXPERTISE

Mr. Back holds a Master's degree in geology (specializing in hydrogeology) with over 29 years of experience in reviewing and evaluating hazardous and nuclear waste disposal technologies; supporting risk assessments, developing and reviewing environmental impact statements and conducting numerical and analytical simulations of surface water/groundwater interactions. His technical experience includes site hydrogeological characterization, conceptual model formulation, and application of numerical models for assessing groundwater movement and fate and transport of contaminants in fractured and porous media. Mr. Back has provided technical support to various Federal clients including the Nuclear Regulatory Commission, Defense Nuclear Waste Safety Board, Department of Defense, Department of Energy, Department of Justice, Environmental Protection Agency, US Air Force, and US Army Corps of Engineers for numerous projects involving performance assessments, groundwater contamination investigations, environmental impact and risk assessments, regulatory development/applications, and litigation cases. Mr. Back is an expert in modeling the fate and transport of radionuclides in surface water and groundwater and has supported NRC in their development of several NUREGS including NUREG 1640, 5794 and 5352, and has modeled radionuclide transport on numerous DOE, NRC and EPA sites. Mr. Back is also the lead author of several NRC/EPA/DOE joint guidance documents developed to facilitate the selection and application of groundwater models at LLW sites, EPA sites, and federal facilities, including *A Technical Guide to Groundwater Model Selection at Sites Contaminated with Radioactive Substances*, 1994, EPA 402-R-94-012, and "A Review Guide for Model Applications at Sites Contaminated with Radioactive Substances," 1996, EPA 540-R-96-003.

PROFESSIONAL EXPERIENCE

(1994 – Present), Sanford Cohen and Associates, *Hydrogeologist*
(1994 – Present), *Consulting Hydrogeologist*
(1988 – 1994), HydroGeoLogic, Inc., *Principal Hydrogeologist*
(1985 – 1988), Roy F. Weston, Inc., *Hydrogeologist*
(1982 – 1985), Oklahoma State University, *Research Assistant*

Summary of Relevant Experience

- Mr. Back is currently providing groundwater modeling support to EPA Region 7 at two Superfund sites in Nebraska (i.e., Garvey and W. Hwy & 281). Mr. Back is applying computer codes MODFLOW-2000, MT3DMS, PEST, and MODPATH to predict the fate and transport of contaminants in three dimensions.
- Mr. Back is currently providing performance assessment support to the Utah Department of Environmental Quality in their decision whether to allow a low-level radioactive waste site to be built in Clive, Utah. Mr. Back is using the models HYDRUS and GoldSim to predict the fate and transport of several radionuclides; including uranium.
- Mr. Back is currently providing hydrogeological support to the Department of Interior at the Tuba City uranium site. Mr. Back has assisted with the development of the site conceptual model, providing oversight of the remedial investigation and feasibility study and performed modeling of uranium fate and transport by applying computer codes MODFLOW-2000, MT3DMS, PEST, and MODPATH.
- For the past 25 years Mr. Back has provided technical support to the EPA in their independent review of DOE's evaluation of the long-term integrity of the Waste Isolation Pilot Plant, Carlsbad, NM. Mr. Back was responsible for modeling analyses that included 2- and 3-D modeling involving multiphase flow and metals/radionuclide transport through fractured medium at variable densities (i.e., brine) and under partially saturated conditions. He also supervised the application of structural deformational codes to estimate the rates of creep closure of the repository and to evaluate the effects of mining on the overlying aquifers.
- Mr. Back continues to provide technical and management assistance to DOE's Office of NEPA Policy and Compliance. In this capacity, he has contributed to the development numerous Environmental Impact Statements (EISs). Mr. Back managed the EIS technical review for four gasification projects (i.e., Taylorville, Illinois; Medicine Bow, Wyoming; Moss Point, Mississippi; Rock Port, Indiana). Mr. Back coordinated and performed technical reviews of Environmental Assessments (EA) for 8 Wind Energy Projects that were being funded from the *American Recovery and Reinvestment Act of 2009* administered by the U.S. Department of Energy (DOE) pursuant to the Department's State Energy Program (SEP). Mr. Back also managed and participated in the technical reviews for the Surplus Plutonium Disposition EIS was to reduce the threat of nuclear weapons proliferation worldwide by conducting disposition of surplus plutonium in the United States in an environmentally safe and timely manner; the Mesaba Energy Project which is an Integrated Gasification Combined Cycle (IGCC) electric power generating station located in Minnesota; the Chemistry and Metallurgy Research Building Replacement Project for the Storage of Elemental Mercury at Los Alamos National Laboratory (LANL), New Mexico; and an EIS for the Designation of Energy Corridors on Federal Land in the 11 Western States. He has also supported the DOE in NEPA driven EIS activities related to the following; the Tank Closure and Waste Management EIS for the Hanford Site, Richland, WA; EIS for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center; Site-Wide EIS for the Nevada Test Site and Offsite Locations in the State of Nevada; Site-Wide EIS for the Y-12 National Security Complex; EIS for the Abengoa Biorefinery Project near Hugoton, KS; EIS for the Operation of a Biosafety Level-3 Facility at Los Alamos National Laboratory, Los Alamos, NM; Programmatic EIS, and EIS for the Greater than Class C Disposal Options.

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- Mr. Back is currently providing NEPA support to the Food and Drug Administration for their Proposed Rule for Product Safety. Mr. Back authored the water resources sections of the Draft EIS currently out for public comment.
 - Mr. Back has conducted numerical modeling of groundwater flow and radionuclide transport through the thick unsaturated tuffs at Los Alamos. Ephemeral perched water systems routed the groundwater toward the canyon walls and created a highly complex hydrogeological system that was very difficult to solve computationally with the tools available at the time (1989). To solve this problem, Mr. Back worked with Dr. Kool of HydroGeoLogic Inc. to develop a finite-element computer code capable of solving highly nonlinear problems in the unsaturated zone. These efforts led to the code VAM2D, which was adopted by the NRC as NUREG-5352. As part of that exercise, VAM2D was benchmarked against PORFLOW which subsequently has been used to verify the flow and transport modules within GoldSim. Mr. Back has subsequently applied VAM2D/3D to numerous Federal facilities including Hanford, Los Alamos, Fernald, Savannah River, Paducah, and Weldon Springs.
 - Mr. Back assisted in the development and testing of STAFF3D (NUREG/CR-5794), a finite element code which can simulate fully 3-D groundwater flow and contaminant transport through porous media. Applied the code at a number of sites. The code has also been used by a number of independent parties: Sandia National Laboratory has used it to model potential radionuclide transport from the WIPP, and Lawrence Livermore has also used STAFF3D to model groundwater flow and contaminant transport at Yucca Mountain.
 - ***Shattuck Superfund Site, Denver, CO.*** Mr. Back participated on an expert panel convened by the USEPA and consisting of six prominent practitioners from relevant science and engineering disciplines to conduct an independent review of the actual technical performance of the remedy at Shattuck, a Superfund site with radioactive waste in urban Denver that was remediated in 1998. The final remedy under the Record of Decision (ROD) was a significant departure from the remedy implied during public hearings. In reaction to community and political outrage, the EPA created a panel to conduct an independent review of the actual technical performance of the remedy. The review recommended that the site remedy be re-evaluated, pending completion of a series of additional sampling and analytic work recommended within the report. In the end, the original ROD was reversed (the first time in the history of the CERCLA program), and a revised remediation was instituted for excavation, removal, and transport for offsite disposal.
 - ***U.S. EPA, Maxey Flats, Modeling Radionuclide Transport.*** Provided technical support to EPA (Region 4) in assessing the performance of the remedial alternatives that were implemented to contain groundwater contamination. As part of that work, Mr. Back performed 3-dimensional modeling of fate and transport of radionuclides. The results of the modeling were used to support a Baseline Risk Assessment which was accepted by EPA and integrated into their Record of Decision. As part of his support Mr. Back made multiple site visits, attended public meetings, and worked with the responsible parties and State agencies to ensure a coordinated solution.
 - ***Defense Nuclear Waste Safety Board (DNFSB).*** Mr. Back was responsible for evaluating DOE's Low-Level Waste Performance Assessments at numerous DOE facilities. Mr. Back was the Co Author for several guidance documents targeted at reviewing Performance Assessments performed by DOE of their proposed low level waste facilities.
 - ***USEPA– Region 3.*** Mr. Back currently serves as a technical reviewer for EPA oversight activities involving PRPs at Superfund sites. In this capacity Mr. Back performs technical reviews, assist EPA

in negotiations with the PRPs, assists in ROD modifications, provides field oversight and remediation recommendations. Under this contract Mr. Back has supported EPA at the following CERCLA sites: McAdoo, PA; Standard Chlorine, DE; Jackson, Ceramix, PA; Breslube Penn, PA; Central Chemical, PA; Croyden, PA; Maryland Sand and Gravel, MD; North Penn 6, PA; North Penn 3, PA; Spectron, PA; and Bendix, MD.

TECHNICAL REPORTS

- Czyscinski, K, and D. Back. 2002. "A Site-Specific Approach For Defining A Controlled Area For The Yucca Mountain Repository". Proceedings of the 2002 Waste Management Conference.
- Peake, T. and D. Back, 1998. "A Review of the Waste Isolation Pilot Plant Performance Assessment, 1998. <http://www.epa.gov/radiation/wipp/dockets.html>
- Back, D. and J. Mauro. 1996. NRC/EPA/DOE Guidance Document "A Review Guide for Model Applications at Sites Contaminated with Radioactive Substances," EPA 540-R-96-003 (lead-author).
- Back, D. and J. Mauro. 1994. NRC/EPA/DOE Guidance Document "A Technical Guide to Groundwater Model Selection at Sites Contaminated with Radioactive Substances," EPA 402-R-94-012 (lead-author).
- Back, D., 1995. "Groundwater Flow and Contaminant Transport Modeling at the Waste Isolation Pilot Plant," <http://www.epa.gov/radiation/wipp/dockets.html>
- Panday, S. and D. Back, "Computational Methods for the Solution of Multiphase Equations" 1995. <http://www.epa.gov/radiation/wipp/dockets.html>
- Back, D. and J. Mauro. 1993 "Computer Models Used to Support Cleanup Decision-Making at Hazardous and Radioactive Waste Sites," 1993, EPA 402-R-93-005.
- Pardie, R. and D. Back, 1993."Environmental Pathway Models - Ground-Water Modeling in Support of Remedial Decision-Making at Sites Contaminated with Radioactive Material," 1993, EPA 402-R-93-009.
- Pardie, R. and D. Back, 1993. "Environmental Characteristics of EPA, NRC, and DOE Sites Contaminated with Radioactive Substances," 1993, EPA 402-R-93-011.
- Back, D.B., and Hess, E., 1990. Computer Modeling in the Site Assessment Process. A Case History. Presented at 1990 Superfund Conference.
- Robertson, J.B., R. Scheinfeld, and D.B. Back, 1986. Underground Storage Tank Leakage Prevention, Detection and Correction: A Review and Evaluation of Feasible Approaches and Designs, Roy F. Weston, Inc. for the Petroleum Marketers Association of America.
- Hounslow, A.W., and D.B. Back, 1985. Chemical Evaluation of Water Supplies in Southwestern Oklahoma," Oklahoma State University, final report to the Oklahoma Water Resources Board, Oklahoma City, Oklahoma.
- Hounslow, A.W., and D.B. Back, 1985. The Source and Occurrence of Nitrate in Well Water in Southwestern Oklahoma, Oklahoma State University, final report to the Oklahoma Water Resources Board, Oklahoma City, Oklahoma.
- Hounslow, A.W., and D.B. Back, 1984. Characterization of Soil Organic Matter Using Instrumental Methods, Proceedings of the Second International Conference on Groundwater Quality, Tulsa, Oklahoma.