

(6) Development of Materials Damage Functions

A damage function is the time-dependent evolution of a material parameter or parameters leading to the eventual failure of the material under specified environmental conditions. Once developed, such functions can be used to predict failure conditions in specified industrial applications. We are presently trying to determine such functions for crevice propagation and hydrogen-induced cracking in alpha titanium alloys, and for the crevice propagation on Ni-Cr-Mo alloys.

(7) Formation of Protective Coatings on Reactive Metals

The industrial use of light metals, such as magnesium, is limited by their reactivity in most exposure environments. We are studying the formation of protective coatings on such materials.

(8) Kinetics of Copper Corrosion in Sulphide Solutions

The choice of nuclear waste containers for countries contemplating nuclear waste disposal in anoxic granitic environments (Canada, Sweden, Finland) is copper, since this material should be thermodynamically stable. However, the presence of sulphide (from either mineral dissolution or the action of sulphate reducing bacteria) could render copper thermodynamically unstable under disposal conditions. We are studying the growth kinetics and protective properties of sulphide films on Cu. By comparison to oxide systems, the large size of the sulphide ion makes sulphide film growth rapid and variable, since the films are electrically and ionically-conducting and grow incoherently.

(9) Corrosion on Gas Transmission Pipelines

The development of accurate databases is essential in the development of electrochemical models to predict pipeline failures and to optimize the application of cathodic protection. We are attempting to produce relationships between corrosion rates, the nature of surface corrosion deposits, and the anticipated corrosion scenarios. The primary goal is to provide a template for rapidly determining field corrosion behaviour.

I) PUBLICATIONS.**REFEREED JOURNALS**

1. D.Ofori, P.G.Keech, J.J.Noel and D.W.Shoesmith: Influence of Deposited Films on the Anodic Dissolution of Uranium Dioxide; submitted to J.Nuclear Mater., September 2009
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64. Effect of Temperature on the Dissolution of Magnetite from Carbon Steel Surfaces in EDTA Solutions, D.W. Shoesmith, D.S. Mancey, D. Doern, Commercial Report to Ontario Hydro, March 1985. (Proprietary).
65. Dissolution of Magnetite Films on Carbon Steel in EDTA Solutions, D.W. Shoesmith, D.S. Mancey, D. Doern, Commercial Report to Ontario Hydro, Jan. 1985. (Proprietary).
66. The Chemistry of Nuclear Fuel Dissolution Under Waste Repository Conditions, D.W. Shoesmith, S. Sunder, M.G. Bailey and L.H. Johnson, in Proc. of the Workshop on the Source Term for Radionuclide Migration from a Waste Repository, OECD Nuclear Energy Agency, U.S. Department of Energy, Albuquerque, New Mexico, 1984, Sandia National Laboratory Report, SAND-0380, July 1985.
67. The Effects of Container-Corrosion and Alpha-Radiolysis of Water on the Corrosion of UO_2 ,

- D.W. Shoesmith and M.G. Bailey, in Proceedings of a Workshop on "The Corrosion Performance of Nuclear Fuel Waste Containers", edited by K. Nuttall and P. McKay, Ottawa, Nov. 21-22, 1983, p. 95. AECL Technical Record, TR-340 (1985).
68. Corrosion of Carbon Steel in CO₂-Containing Injection Fluids Used in In-Situ Bitumen Recovery from Oil Sands, D.W. Shoesmith and M.G. Bailey, Contract Report to the Alberta Research Council (1984). (Proprietary).
 69. Leaching and Radiolysis Studies on UO₂ Fuel, L.H. Johnson, S. Stroes- Gascoyne, D.W. Shoesmith, M.G. Bailey and D.M. Sellinger, to appear in Proc. of the 3rd Annual Spent Fuel Workshop, Boston (1983).
 70. Mechanism of Oxidation and Dissolution of UO₂, S. Sunder, D.W. Shoesmith, M.G. Bailey and G.J. Wallace, Proc. of 15th Information Meeting on Nuclear Fuel Waste Management, Atomic Energy of Canada Limited Technical Record, TR-216, p. 171, August 1983.
 71. Mechanisms of Metal and Metal Oxide Corrosion, D.W. Shoesmith, P. McKay and M.G. Bailey, Proc. of 15th Information Meeting on Nuclear Fuel Waste Management, Atomic Energy of Canada Limited Technical Record, TR-216, p. 189, August 1983.
 72. Electrochemical and X-Ray Photoelectron Spectroscopic Studies of UO₂ Fuel Dissolution, D.W. Shoesmith, S. Sunder, M.G. Bailey and G.J. Wallace, Proc. of the 13th Information Meeting on Nuclear Fuel Waste Management, Atomic Energy of Canada Limited Technical Record, TR-201, October 1982.
 73. Dissolution of Magnetite Films on Iron and Carbon Steel Surfaces in Solutions of Chelating Agents, D.W. Shoesmith, T.E. Rummery, W. Lee and D.G. Owen.
 74. Corrosion, Iron Transport and Deposition in H₂S-H₂O Systems. A Review of Laboratory Studies and Plant Experience, D.W. Shoesmith.
 75. Characterization of Surface Reactions Occurring During Cyclic Decontamination of Carbon and Stainless Steel Coupons Using the CAN-DECON Process, D.W. Shoesmith, N.S. McIntyre, F.W. Stanchell, W. Lee and D.G. Owen.

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Education:

- 1995-2000 **Ph.D. Earth Sciences**, September 2000
University of California at Santa Cruz
Thesis title: *Multiple Scales of Hydrothermal Circulation in the Oceanic Crust: Studies from the Juan de Fuca Ridge Crest and Flank.*
- 1992-1995 **M. A., Earth Sciences**, May 1999
Wesleyan University, Middletown, CT
Thesis title: *The Transport of Nitrogen and the Residence Time of Water in the Housatonic River Estuary.*
- 1987-1991 **B. A., Latin American History**, May 1991
Wesleyan University, Middletown, CT

Positions Held:

- 2009 to Present **Principal Member of Technical Staff**
Sandia National Laboratories
Albuquerque, NM
(Photovoltaics and Grid Integration)
- 2003 to 2009 **Principal Member of Technical Staff**
Sandia National Laboratories
Albuquerque, NM
(Subsystems Performance Assessment for the Yucca Mountain Project)
- 2001-2003 **Senior Member of Technical Staff**
Sandia National Laboratories
Carlsbad, NM
(Org. 6821- Performance Assessment and Decision Analysis)
- 2000-2001 **High School Science and Math Teacher**
Colorado Rocky Mountain School
Carbondale, CO
(Geology, Chemistry, and Pre-calculus)

Awards and Grants:

- 2004 Waste Management 2004 Best Poster ANS Award.
- 2003 Sandia National Laboratories 'Spot' Recognition Award for the Salado Flow Peer Review
- 1998 Outstanding Student Paper Award, American Geophysical Union.

1996	Ocean Drilling Program research grant.
1995	University of California Regents Fellowship.
1995	Sigma Xi

Selected Research Experience:

- **PI for Analysis of Photovoltaic Energy System Performance**

Development of PV system performance models, including analysis of system reliability. Analysis of model and parameter uncertainties. Characterization of temporal and spatial variability in solar energy production.

- **PI for MASSIF net infiltration model for Yucca Mountain License Application (2005 to Present)**

Technical Lead for a diverse team of scientists and engineers from Sandia, LANL, private industry, and several universities to develop a distributed-parameter model of net infiltration over a 125 km² area around Yucca Mountain for present and future climates. The model includes calculations of evapotranspiration, streamflow, snowpack, and soil moisture movement. It uses satellite characterization of vegetation response to precipitation, stochastically simulated daily precipitation and temperature data, and a Monte-Carlo approach to estimating uncertainty and parameter sensitivity. The model is used by the Department of Energy (DOE) in the Yucca Mountain License Application, which is currently being reviewed by the Nuclear Regulatory Commission. (Budget ~\$6 million over ~18 months, high national visibility). Our team replaced a USGS model that was discredited by emails suggesting that modeling data was falsified by USGS scientists. This scandal resulted in national media attention, congressional and FBI investigations, and challenged DOE's credibility in the licensing process.

- **PI for Fortymile Wash Ash Redistribution model (FAR) for Yucca Mountain License Application (FY 2007 to Present)**

Responsible for developing and documenting a sediment redistribution model used by DOE to estimate radionuclide transport across the landscape due to mass wasting and fluvial transport and mixing processes. The model uses GIS analyses and hydrologic and geologic field data to determine spatial controls on sediment transport. The model is used by the Department of Energy in their License Application, which is currently being reviewed by the Nuclear Regulatory Commission.

- **3-D Geologic modeling support for the Strategic Petroleum Reserve**

Developed 3-D geologic models of salt domes and solution-mined caverns used to store oil in the Strategic Petroleum Reserve. Performed leaching calculations to support oil movements and planning for new storage sites.

- **PI for multi-phase modeling for the Waste Isolation Pilot Plant 2004 Recertification Application**

Technical Lead for modeling of brine flow through the repository in support of the performance assessment used for the first successful recertification of the WIPP repository in 2004.

- **Multi-dimensional modeling of multi-scale, coupled heat and fluid flow. Influence of heterogeneous permeability, initial and boundary conditions on flow patterns.** (PhD thesis, see publications)
- **Collection and processing of over 400 marine heat flow measurements, heat flow code development (stochastic error analysis, graphical user interface, etc.).** (PhD thesis, see publications)
- **Hydrographic and modeling study of the effect of channel dredging on estuarine circulation and water quality, Housatonic River Estuary, Connecticut.** (Master's thesis project)

Skills:

- Conceptual, analytical and numerical model development and implementation
- Uncertainty and sensitivity analyses
- Extensive experience with a variety of computer platforms and operating systems
- Computer programming in Fortran, C++, Visual Basic, VBA, and Mathcad.
- Software: Mathcad, ArcGIS, MVS (Mining Visualization System), FEHM (coupled heat and mass transport code), LaGrit (mesh generator), GMV (mesh viewer), PEST and Parallel PEST (model-independent parameter estimation code for inverse modeling), Actesolv (aquifer analysis software), MODFLOW, ... and much more.

Selected Field Experience:

- | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1999 | NSF RIDGE Field School: The Troodos Ophiolite and Mid-Ocean Ridge Processes, Larnaca, Cyprus. |
| 1997 | Marine Heat Flow Specialist: Scientific Expedition to Mariana Forearc. Heat flow measurements made with ROV Jason in areas of suspected fluid flow (1 month scientific expedition). |
| 1996 | Shipboard Scientist: Physical Properties Specialist, Ocean Drilling Program Leg 168, Juan de Fuca Ridge Flank Hydrothermal Processes (2 month scientific expedition). |
| 1995 | Heat Flow Specialist: Scientific Cruise to Middle Valley, Juan de Fuca Ridge. Investigation of fine scale hydrogeology and geochemistry of areas of active hydrothermal venting (1 month scientific expedition). |
| 1994 | Detailed hydrographic and geochemical surveys of the Housatonic River estuary, Connecticut. Deployment of acoustic Doppler current profiler for fine resolution of estuarine currents. |

Special Meetings and Presentations:

- | | |
|------|------------------------------------------------------------------------------------------|
| 2008 | Invited Presentation to the Nuclear Regulatory Commission, Las Vegas, NV (4/2/08) |
| 2007 | Invited Presentation to the Nuclear Waste Technical Review Board, Berkeley, CA (3/14/07) |

- 2004 Presentation to American Geophysical Union Fall meeting: *Agent-Based Modeling Applications for Geosciences*
- 2004 Invited Presentation to an Italian Nuclear Waste delegation. *Overview of WIPP Performance Assessment*. Las Vegas, NV.
- 2004 Presentation to the Geological Society of America Annual Meeting, Denver, CO., *Overview of the performance assessment for the recertification of the waste isolation pilot plant.*
- 2004 Waste Management presentation: *Assessing the Effect of Actual Waste Emplacement Patterns on the Performance Assessment for the Recertification of the Waste Isolation Pilot Plant*, SAND2004-0355C (Best Poster ANS Award)
- 2003 Presentation to the Radiochemistry Meeting, Carlsbad, NM
- 2001 Invited presentation at Sandia National Laboratory, Albuquerque, NM
- 2001 Invited presentation at Livermore National Laboratory, Livermore, CA
- 1999 Invited presentation at Los Alamos National Laboratory, NM
- 1997 Ocean Drilling Program Leg 168 Post Cruise Meeting, Cambridge, UK.
- 1996 Hubbert Quorum on Hydrogeology (USGS, Menlo Park, CA)

Publications:

- 2009 Stein, J.S. and others ; Manuscript in preparation for submittal to *Journal of Hydrology* describing analysis of net infiltration model for Yucca Mountain. (90% complete).
- 2007 **Stein, J.S.**, *Redistribution of Tephra and Waste by Geomorphic Processes Following a potential Volcanic Eruption at Yucca Mountain, Nevada* (MDL-MGR-GS-000006 REV00). 316 pages.
- 2007 **Stein, J.S.**, *Simulation of Net Infiltration for Present-Day and Potential Future Climates* (MDL-NBS-HS-000023 REV01). 942 pages.
- 2006 Phelan, J.M; Webb, S.W; Sallaberry, C.M.; **Stein, J.S.**; and Hadgu, T. *Measurement and modeling of energetic-material mass transfer to soil-pore water - Project CP-1227 final technical report*. SAND2006-2611
- 2005 Webb, S.W. and **Stein, J.S.** *Measurement and modeling of energetic material mass transfer to soil pore water : Project CP-1227 : FY04 annual technical report*, SAND2005-0345.
- 2005 **Stein, J.S.** and Rautman, C.A., *Conversion of the Bryan Mound Geological Site Characterization Report to a Three-Dimensional Model*, SAND2005-2009
- 2004 **Stein, J.S.**; Rautman, C.A.; and Snider, A.C. *Conversion of the West Hackberry Geological Site Characterization Report to a Three-Dimensional Model*, SAND2004-3981
- 2003 Rautman, C.A. and **Stein, J.S.** *Conversion of the Bayou Choctaw Geological Site Characterization Report to a Three-Dimensional Model*, SAND2003-3299

- 2003 **Stein, J. S.** and A. T. Fisher, Observations and models of lateral hydrothermal circulation on a young ridge flank: Numerical evaluation of thermal and chemical constraints, *Geochem. Geophys. Geosyst.*, 4(3), 1026, doi:10.1029/2002GC000415.
- 2002 **Stein, J. S.** , Hansen, C. W., and Lord, D.L., Performance Assessment for the Recertification of the Waste Isolation Pilot Plant, *EOS Trans Am. Geophys. Union*, 83 (Fall supplement).
- 2001 **Stein, J. S.** and Fisher, A. T., Multiple scale hydrothermal circulation in Middle Valley, northern Juan de Fuca Ridge: Physical constraints and geologic models, *Journal of Geophysical Research*, 106, p. 8563-8580.
- 2001 **Stein, J. S.** and Fisher, A. T., Lateral Hydrothermal Circulation Beneath the Eastern Flank of the Juan de Fuca Ridge: Thermal, Chemical and Modeling Constraints, *EOS Trans Am. Geophys. Union*, 82 (Fall supplement).
- 2000 **Stein, J. S.**, and Fisher, A.T., Lateral Hydrothermal Circulation Beneath the Eastern Flank of Juan De Fuca Ridge: Thermal, Chemical and Modeling Constraints, *EOS Trans Am. Geophys. Union*, 81 (Fall supplement).
- 2000 Rosenberg, N., A. T. Fisher, and **J. S. Stein**, Large-scale lateral heat and fluid transport in the seafloor: revisiting the well-mixed aquifer model, *Earth and Planetary Science Letters*, 182, p. 93-101.
- 1999 **Stein, J. S.** and Fisher, A.T., Modeling unforced lateral flow beneath the eastern flank of the Juan de Fuca Ridge, *EOS Trans Am. Geophys. Union*, 80 (Fall supplement).
- 1999 E. E. Davis, D. S. Chapman, K. Wang, H. Villinger, A. T. Fisher, S. W. Robinson, J. Grigel, D. Pribnow, **J. S. Stein**, and K. Becker, Regional heat-flow variations across the sedimented Juan de Fuca Ridge eastern flank: Constraints on lithospheric cooling and lateral hydrothermal heat transport, *Journal of Geophysical Research*, 104, p. 17,675-17,688.
- 1999 Stauffer, P., **Stein, J. S.** , Fisher, A., The effect of enthalpy representation on coupled heat and mass transfer solutions, *EOS Trans Am. Geophys. Union*, 80 (supplement): p. F415.
- 1999 **Stein, J. S.**, and Fisher, A.T., Pressure and temperature distributions within active hydrothermal systems: new in-situ measurements and models, implications for permeability structure in oceanic crust, RIDGE Troodos Field School, Larnaca, Cyprus.
- 1998 **Stein, J. S.**, Fisher, A.T., Langseth, M., Jin, W., Iturrino, G., Davis, E., Fine-scale heat flow, shallow heat sources, and decoupled circulation systems at two seafloor hydrothermal sites, Middle Valley, northern Juan de Fuca Ridge, *Geology*, 26, p. 1115-1118.
- 1998 **Stein, J. S.**, Fisher, A.T., Decoupled shallow and deep hydrothermal systems in Middle Valley: implications for flow dynamics and geometries, *EOS Trans Am. Geophys. Union*, 79 (supplement): p. F920.
- 1998 Fisher, A.T., and **Stein, J. S.**, Interpretation of borehole pressure and temperature measurements in seafloor hydrothermal systems, *EOS Trans Am. Geophys. Union*, 79 (supplement): p. F252-253.

- 1997 **Stein, J. S.**, Fisher, A.T., M Langseth, G. Iturrino, W. Jin, D. N. Daniel, and E. E. Davis, Thermal Models of two Areas of Active Venting, Middle Valley, northern Juan de Fuca Ridge, *EOS Trans Am. Geophys. Union*, 79 (supplement): p. F672.
- 1997 Giambalvo, E., **Stein, J. S.**, Fisher, A.T., Influence of bottom water temperature fluctuations on shallow thermal profiles in the Mariana Forearc, *EOS Trans Am. Geophys. Union*, 79 (supplement): p. F717-718.
- 1997 Rosenberg, N., Fisher, A.T., and **Stein J. S.**, Large-scale lateral heat and fluid transport within the seafloor, *EOS Trans Am. Geophys. Union*, 79 (supplement): p. F672.
- 1997 Fisher, A.T., M Langseth, P. Baker, W. Ryan, **J. S. Stein**, S. Glenn, P. Schultheiss, R. Zierenberg, G. Iturrino, W. Jin, E. Darlington, W. Goodfellow, D. N. Daniel, A. Conly, S. Cross, M. Grove, and B. Cramer, The devil's in the details: Hydrology of Middle Valley active venting areas, *EOS Transactions*, 78, n. 16, p. 165-170.
- 1996 Fisher, A.T., E. Davis, J. Grigel, D. Pribnow, K. Becker, **J. S. Stein**, On the lateral and vertical scale of ridge-flank hydrothermal circulation, *EOS Trans Am. Geophys. Union*, 77 (supplement): p. F775.
- 1996 **Stein, J. S.**, Fisher, A.T., Langseth, M., Iturrino, G., Jin, W., and Daniel, D. N., Complex patterns of heat flow and thermal anomalies in the water column within areas of active venting, Middle Valley, Juan de Fuca, *EOS Trans Am. Geophys. Union*, 77 (supplement): p. S257.
- 1996 Fisher, A.T., M. Langseth, P. Baker, W. Ryan, G. Iturrino, W. Jin, B. Cramer, P. Schultheiss, E. Darlington, R. Zierenberg, W. Goodfellow, **J. S. Stein**, D. Daniel, S. Glenn, M. Grove, and A. Conly, Fine-scale variations in heat and fluid flow at a sedimented spreading center: areas of active venting in Middle Valley, Northern Juan de Fuca Ridge, *EOS Trans Am. Geophys. Union*, 77 (supplement): p. S256.
- 1996 Glenn, S., P. Baker, M. Grove, J. Broda, A.T. Fisher, **J. S. Stein**, R. Zierenberg, W. Goodfellow, A. Conly, S. Burns, Porewater geochemistry in the area of active venting, Middle Valley, Juan de Fuca Ridge, *EOS Trans Am. Geophys. Union*, 77 (supplement): p. S134.
- 1995 **Stein, J. S.**, Patton, P.C., and Kincaid, C., Modeling the residence time of water and nitrogen concentration in the Housatonic River estuary, *NEGSA Abstracts with Programs*, 1995 Northeast Annual Meeting: p. 83.
- 1995 **Stein, J. S.**, Kincaid, C., Patton, P., and Hoshide, A., Numerical modeling of circulation and residence time of water in the Housatonic River estuary, *EOS Trans Am. Geophys. Union*, 75 (supplement): p. 305.

DANIEL STEPHENS



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Specialization

Hydrogeology; fate and transport; allocation; artificial recharge; groundwater resource evaluations; stream-aquifer interaction; applications of numerical models; remediation system effectiveness analysis.

Academic Degrees

Ph.D., Hydrology, University of Arizona, 1979

M.S., Hydrology, Stanford University, 1974

B.S., Geological Science (with honors), Pennsylvania State University, 1971

Professional Registration

Certified Professional Hydrogeologist No. 406, American Institute of Hydrology

Certified Hydrogeologist No. HG355, California

Professional Geologist No. 5937, California

Professional Geologist No. 28483, Arizona

Professional Geologist No. 936, Idaho

Professional Geoscientist No. 1767, Texas

Technical Review Boards

Orange County Water District Groundwater Replenishment System, Blue Ribbon Advisory Panel, National Water Research Institute,

Yucca Mountain Project, Department of Energy Expert Elicitation on Recharge

Westinghouse Hanford Company, Hanford, Washington: Peer Review Panelist, Site and Grout Performance Assessments

Los Alamos National Laboratory, Los Alamos, New Mexico: Blue Ribbon Panel, Review and Hydrogeologic Data Needs for the Environmental Restoration Program at LANL

Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho: Executive Committee Chairman, National Roadmap for Vadose Zone Science and Technology

Ernest Orlando Lawrence Berkeley Laboratory, Oakland, California: Earth Sciences Division Annual Review Committee

Advisory Boards

Association of Ground Water Scientists and Engineers (National Ground Water Association) - Board of Directors 2007-2010

The University of Arizona, Hydrology and Water Resources Department Advisory Committee, Chairman

The University of Arizona, College of Science Dean's Board of Advisors

New Mexico Tech, Presidential Advisory Committee

Altela, Inc., Technical Advisory Board, Albuquerque, NM



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Representative Professional Assignments

Fate and Transport Analysis

- ◆ Gasoline Refinery Contamination, Cost Allocation, Tosco Refinery, Texaco, Inc., Martinez, California
- ◆ MTBE Contamination Cost Allocation, Shell Oil Company, Southern California
- ◆ Oil Recycling Facility, CERCLA Cost Allocation, Morrison-Knudsen, Salt Lake City, Utah
- ◆ Oil Pipeline Spill, Allocation, Fowler vs. ExxonMobil et al., Oklahoma
- ◆ Chlorinated Solvents, CERCLA Cost Allocation, Zero Corporation, San Fernando Valley, California
- ◆ Chlorinated Solvents in Groundwater, Allocation, Cascade Corporation, Portland, Oregon
- ◆ Pesticide and Herbicide Migration, Agrochemical Facility, Cost Recovery Action, Santa Fe Rail, Arvin, California
- ◆ Wood Treating Facilities, Insurance Coverage Case, International Paper
- ◆ Nitrate Contamination in Groundwater, Apache Nitrogen, Arizona
- ◆ Perchlorate Impacts, Rialto, California
- ◆ Perchlorate, NDMA; Aerojet Facility, State Water Quality Control Board, Rancho Cordova, California
- ◆ Methane Contamination, Natural Gas Operations, Southwestern Colorado
- ◆ East Austin Tank Farm, Identification of Petroleum Hydrocarbon Contamination, Travis County District Attorney, Texas
- ◆ Coal Tar, Insurance Coverage Case, Phelps Dunbar, LLP, Manufactured Gas Plant, Louisiana
- ◆ Technical Expert for Insurance Coverage Case, Carlsbad, New Mexico
- ◆ Hydrogen Sulfide Contamination, Underground Gas Storage Facility, El Paso Natural Gas, Southern New Mexico
- ◆ Former Oil Refinery, Property Damage, Kansas
- ◆ Tar Sand/Asphalt Refinery Contamination, Cost recovery action, Oxnard Refinery, Oxnard, California
- ◆ Oil Field Brine Contamination, Samson v ExxonMobil et al, Oklahoma
- ◆ Oil Field Brine Contamination, Cole Ranch, Property Damage Case, Midland, Texas
- ◆ Brine and NORM Contamination, Martha Oilfield, Kentucky
- ◆ Oil Field Brine Contamination, Paul Hamilton, Caprock, New Mexico
- ◆ Acid and Metals in Groundwater, Phelps Dodge Corporation, Pinal Creek, Cost Recovery Litigation, Miami, Arizona
- ◆ Umetco Minerals Corporation, assess mill operations on drinking water supply, Uravan, Colorado
- ◆ Copper Flats Mine Permit Review, Consultant to New Mexico Energy & Minerals Division, Truth or Consequences, New Mexico
- ◆ Mine and Mill Tailings, CERCLA Site Investigation, Cyprus-Amax, Pecos, New Mexico



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- ◆ Contaminant Transport/Uranium and Vanadium Mill, Colorado Department of Health, Cañon City, Colorado
- ◆ Groundwater and Surface Water Contamination, LAC Minerals Corporation, Santa Fe, New Mexico
- ◆ Chlorinated Solvents, Technical Consultant for Mediator, Puente Valley, San Gabriel Valley, California
- ◆ Technical Support, Toxic Tort and Remediation, Tucson International Airport CERCLA Site, Tucson, Arizona
- ◆ Chlorinated Solvents in Groundwater, Insurance Coverage Case, Phelps Dunbar, LLP, CERCLA Site, Mountain View, California
- ◆ Chlorinated Solvents at Rocket Engine Test Sites, Insurance Litigation, Rockwell International, Contaminated Sites Throughout U.S.
- ◆ Chlorinated Solvents, Dry Cleaner Site, Insurance Coverage Case, Stockton, California
- ◆ Chlorinated Solvent Storage Tank Site, Insurance Coverage Case, Phelps Dunbar, LLP, San Jose, California
- ◆ Dense Non-Aqueous Phase Liquid (DNAPL) Migration, F&B Manufacturing Corporation, Phoenix, Arizona
- ◆ Evaluation of Remedial Action for TCE Contamination, Tucson Airport Authority, Tucson, Arizona
- ◆ Chlorinated Solvents, Eagle-Picher Industries, Inc., Property Damage Case, Security, Colorado
- ◆ Technical Expert for Contaminant Migration, RCRA Site, Envirosafe Corporation, Boise, Idaho
- ◆ Columbia Helicopters, Technical Expert, Insurance Coverage Case, Aurora, Oregon
- ◆ CERCLA Site, Halliburton Corporation, Coffeyville, Kansas
- ◆ Dry Cleaner Site, PCE Release, Insurance Coverage Case, Uvalde, Texas
- ◆ Chlorinated Solvents, GE South Valley, Technical Expert, Natural Resources Damages, Groundwater Contamination, Albuquerque, New Mexico
- ◆ Beverage Bottling Plant, Environmental Site Assessment, City of Roswell, New Mexico
- ◆ PCBs and Chlorinated Solvents at Compressor Stations Site Assessment, ENRON Corporation, New Mexico
- ◆ PCE-Contaminated Site, Public Service Company of New Mexico, New Mexico
- ◆ Groundwater Modeling Investigation, HydroGeoLogic, Inc., CERCLA Sites, Montana

Water Resources; Geotechnical

- ◆ Basin Recharge Quantification, Vidler Water Company, Carson City, Nevada
- ◆ Basin Recharge, United Water Conservation District, Santa Paula, California
- ◆ Water Budget Analysis, International Boundary and Water Commission, Arizona and California
- ◆ Nationwide Aquifer Yield Survey, U.S. Air Force, MX Missile Program
- ◆ Water Availability Study, Pacific Agricultural Holdings, Inc., Cadiz Basin, California
- ◆ Water Bottling Facility, Source of Groundwater for the Springs, Crystal Geysers, Olancho, California



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Daniel B. Stephens, Ph.D., P.Hg., P.G.

- ◆ Water Rights Case, American Water Development Corporation, Great San Dunes National Monument, Colorado
- ◆ Water Rights Application, The Hide Out of Lincoln County LLC, Angus, New Mexico
- ◆ Collapsing Soil, City of Albuquerque, Albuquerque, New Mexico
- ◆ Residential Water Source Identification, Property Damage Case, City of Albuquerque, New Mexico
- ◆ Regional Groundwater Model Development, Roswell Basin, New Mexico
- ◆ Numerical Modeling for Water Resource Impacts, American Groundwater Consultants, Inc., Albuquerque, New Mexico
- ◆ Numerical Groundwater Flow Model, American Groundwater Consultants, Inc., Jemez Mountains, New Mexico
- ◆ Water Supply Analysis for Water Rights Transfer, Lea County, New Mexico
- ◆ Numerical Modeling for Water Supply Analysis, Andrews Ranch, Prewitt, New Mexico

Landfills; Nuclear Power

- ◆ Landfill Materials Characterization, Casmalia Resources Landfill, Santa Maria, California
- ◆ Nuclear Power Plant Siting, Groundwater Investigations, San Diego Gas & Electric, Colorado River Region, Arizona and California
- ◆ Landfill Soil and Liner Characterization, IT Corporation, Imperial Valley, California
- ◆ High Level Nuclear Waste Repository, Hydrogeologic Study, U.S. Nuclear Regulatory Agency, Deaf Smith County, Texas
- ◆ Water Budget Study Review, New Mexico Environmental Evaluation Group, Waste Isolation Pilot Plant, Southeastern New Mexico
- ◆ RCRA Facility Investigation, Los Alamos National Laboratory, New Mexico
- ◆ Landfill Site Investigation for Environmental Restoration, Los Alamos National Laboratory, New Mexico
- ◆ NuMex Landfill Permit Application, Public Hearing, New Mexico Environment Department, southern New Mexico
- ◆ Recharge and Hydrogeologic Analysis, Low-Level Radioactive Waste Disposal Site, El Paso County, Texas

Professional Affiliations

American Chemical Society
American Institute of Hydrology
American Society of Agronomy
American Society for Testing and Materials
American Society for Mining & Reclamation
American Geophysical Union
American Water Resources Association
Arizona Hydrological Society
Association for the Environmental Health of Soils
Crop Science Society of America

Geological Society of America
Ground Water Resources Association of California
International Association of Hydrogeologists
International Society of Environmental Forensics
National Ground Water Association
Nevada Water Resources Association
New Mexico Geological Society
Sigma Xi, The Scientific Research Society
Soil Science Society of America



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Professional Experience

- Daniel B. Stephens & Associates, Inc., Albuquerque, NM
Chairman of the Board and Principal Hydrologist, 2000 to Present
President, 1984 to 2000
- University of New Mexico, Albuquerque, NM
Adjunct Professor of Hydrology, 1990 to Present
- New Mexico Institute of Mining and Technology, Socorro, NM
Adjunct Associate Professor of Hydrology, 1989 to Present
Chairman, Geoscience Department, 1984-1987
Associate Professor of Hydrology, 1983-1989
Assistant Professor of Hydrology, 1979-1983
- University of Arizona, Tucson, AZ
Instructor of Hydrogeology, 1978
- Harshbarger and Associates, Tucson, AZ
Hydrologist, 1976-1978
- Fugro, Inc., Long Beach, CA
Hydrologist, 1974-1975
- Bechtel, Inc., San Francisco, CA
Geologist, 1973
- Gilbert and Associates, Inc., Reading, PA
Geologist, 1972

Books and Chapters of Books

- Stephens. 2008. Vadose Zone Hydrogeology: Basic Principles, Characterization, and Monitoring, Chapter 12, *In* Manual of Applied Field Hydrogeology, second edition, Willis Weight, editor. McGraw-Hill, New York.
- Stephens, D.B. 1999. Monitoring for Groundwater Management in (Semi-) Arid Regions. Chapter 4, *In* Vadose Zone Monitoring Strategy to Protect Aquifers from Contamination, UNESCO, Wageningen, The Netherland.
- Stephens, D.B. 1996. Vadose Zone Hydrology. CRC Press, Boca Raton, Florida.
- Stephens, D.B. 1993. Hydraulic conductivity assessment of unsaturated soils. *In* D.E. Daniels and S.J. Trautwein (Eds.), Hydraulic Conductivity and Waste Contaminant Transport in Soils, ASTM STP 1142, American Society for Testing and Materials, Philadelphia, Pennsylvania.
- Stephens, D.B. 1992. Application of the borehole permeameter. Chapter 4 *In* Advances in Measurement of Soil Physical Properties: Bringing Theory into Practice. SSSA Special Publication No. 30, Soil Science Society of America, Madison, Wisconsin.

Articles in Professional Journals

- Simco, A., D.B. Stephens, K. Calhoun, and D.A. Stephens. 2009. Historic Irrigation and Drainage at Priestley Farm by Joseph Elkington and William Smith. *Vadose Zone Journal* (published on-line September 13, 2009).
- Stephens, D.B. 2009. J.D. Mather (ed.), Book review: 200 Years of British Hydrogeology, The Geological Society, London, 2004. *Hydrogeology Journal* (published on-line June 23, 2009).



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- Stephens, D.B. 2009. An Imminent Human Resource Crisis in Ground Water Hydrology? *Ground Water* 47(2): 176-183. March - April 2009.
- Stephens, D.B. 2009. Also consider the recharge. Technical commentary. *Ground Water* 47(1):2-3. January - February 2009.
- Stephens. 2008. Recent Trends in Hydrogeology and Environmental Consulting and A Perspective on the Maturing of the Hydrogeology Profession. *Journal of Hydrologic Engineering* 13(1):20-27.
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- Stephens, D.B. and M.A. Ankeny. 2004. A missing link in the historical development of hydrogeology. *Ground Water* 42(2):304-309.
- National Vadose Zone Science and Technology Roadmap Executive Committee, Daniel B. Stephens, Chair. 2002. Letter to the editor on a national strategy for vadose zone science and technology. *Vadose Zone Journal* 1(1):197-198.
- Graves, B.J., D. Jordan, D. Cartron, D.B. Stephens, and M.A. Francis. 2000. Allocating responsibility for groundwater remediation costs. *Trial Lawyer*, 23(2):159-171.
- Stephens, D.B., J.A. Kelsey, M.A. Prieksat, M.G. Piepho, C. Shan, and M.D. Ankeny. 1998. DNAPL migration through a fractured perching layer. *Ground Water* 26(4):605-610.
- Stephens, D.B., K.C. Hsu, M.A. Prieksat, M.D. Ankeny, T.N. Blandford, T.L. Roth, J.A. Kelsey, and J.R. Whitworth. 1998. A comparison of estimated and calculated effective porosity. *Hydrogeology Journal* 6:156-165.
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- Shan, C. and D.B. Stephens, 1995. Steady infiltration into a two-layered soil from a circular source. *Water Resources Research*, 31(8):1945-1952.
- Shan, C. and D.B. Stephens. 1994. Recommendation for usage of SURFER to gridding model results. *Ground Water* 32(3).
- Stephens, D.B. 1994. A perspective on diffuse natural recharge mechanisms in areas of low precipitation. *Soil Science Society of America Journal* 58(1):40-48.
- Stephens, D.B. and L.M. Coons. 1994. Landfill performance assessment at a semi-arid site: Modeling and validation. *Ground Water Monitoring and Remediation*, Winter 1994.
- Shan, C. and D.B. Stephens. 1993. A borehole field method to determine unsaturated hydraulic conductivity. *Water Resources Research* 29(8):2763-2769.
- McCord, J.T., D.B. Stephens, and J.L. Wilson. 1991. Toward validating state-dependent macroscopic anisotropy in unsaturated media: Field experiments and modeling considerations. *In* P.J. Wierenga (Guest Ed.), *Validation of flow and transport models for the unsaturated zone*. *J. Contam. Hydrol.* 7:147-177.
- McCord, J.T., D.B. Stephens, and J.L. Wilson. 1991. Hysteresis and state-dependent anisotropy in modeling unsaturated hillslope hydrologic processes. *Water Resources Research* 27(7):1501-1518.
- McCord, J.T. and D.B. Stephens. 1988. Comment on "Effective relative permeabilities of anisotropic porous media" by Bear, Braester, and Menier. *Transport in Porous Media* 3:207-210.
- Stephens, D.B., J. Havlena, R.G. Knowlton, Jr., E. Mattson, and W. Cox. 1988. Vadose zone characterization of low-permeable sediments using field permeameters. *Ground Water Monitoring Review*, Spring.



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- Stephens, D.B. and S.E. Heermann. 1988. Dependence of anisotropy on saturation in a stratified sand. *Water Resources Research* 24(5):770-778.
- McCord, J.T. and D.B. Stephens. 1987. Lateral moisture flow beneath a sandy hillslope without an impending layer. *Hydrological Processes Journal* 1:225-238.
- McCord, J.T. and D.B. Stephens. 1987. Comment on "Effect of ground-water recharge on configuration of the water table beneath sand dunes" by T.C. Winter. *J. Hydrology* 95:365-367.
- Stephens, D.B. 1987. The significance of natural ground-water recharge in site selection for mill tailings disposal. *AIME Trans.* 280:2064-2068.
- Stephens, D.B., K. Lambert, and D. Watson. 1987. Regression models for hydraulic conductivity and field test of the borehole permeameter. *Water Resources Research* 23(12):2207-2214.
- Stephens, D.B. and R. Knowlton, Jr. 1986. Soil water movement and recharge through sand at a semi-arid site in New Mexico. *Water Resources Research* 22(6):881-889.
- Stephens, D.B. and K. Rehfeldt. 1985. Evaluation of closed-form analytical models to calculate unsaturated conductivity in a fine sand. *Soil Sci. Soc. Am. J.* 49(1):12-19.
- Stephens, D.B. 1985. A field method to determine un-saturated hydraulic conductivity using flow nets. *Water Resources Research* 21(1):45-50.
- Stephens, D.B. 1985. Comments on "A reexamination of the constant head well permeameter method for measuring saturated hydraulic conductivity" by W.D. Reynolds, E.D. Elrick, and G.C. Topp. *Soil Science* 139(2):190.
- Hawkins, D.C. and D.B. Stephens. 1983. Ground water modeling in a southwestern alluvial basin. *Groundwater* 21(6):733-740.
- Byers, E. and D.B. Stephens. 1983. Statistical and stochastic analysis of hydraulic conductivity and particle size in a fluvial sand. *Soil Sci. Soc. Amer. Proc.* 47(6):679-688.
- Person, M., R. Antle, and D.B. Stephens. 1983. Evaluation of the surface impoundment assessment in New Mexico. *Ground Water* 21(6):679-688.
- Stephens, D.B. 1983. Groundwater flow and implications for groundwater contamination north of Prewitt, New Mexico, USA. *J. Hydrology* 61:391-408.
- Stephens, D.B. and S.P. Neuman. 1982. Vadose zone permeability tests 1: Review. *ASCE J. Hydraulics Division* 108 (HY5):623-639.
- Stephens, D.B. and S.P. Neuman. 1982. Vadose zone permeability tests 2: Steady state. *ASCE J. Hydraulics Division* 108 (HY5):640-659.
- Stephens, D.B. and S.P. Neuman. 1982. Vadose zone permeability tests 3: Transient case. *ASCE J. Hydraulics Division* 108 (HY5):660-677.
- Stephens, D.B. and S.P. Neuman. 1982. Free surface and saturated-unsaturated analysis of borehole infiltration tests above the water table. *Advances in Water Resources* 5:111-116.



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Short Courses

- Stephens, D.B. 2009. Artificial Recharge by Surface Infiltration and Vadose Zone Wells. Invited short course with D. Pyne at National Ground Water Association Artificial Recharge of Ground Water. September 24-25, 2009, Baltimore, Maryland.
- Stephens, D.B.. 2008. Artificial Recharge by Surface Infiltration and Vadose Zone Wells. Invited short course with D. Pyne at National Ground Water Association 2008 Ground Water Expo. December 2-5, 2008, Las Vegas, Nevada.
- Stephens, D.B., J.A. Kelsey, J. Hines, J. Kay, and E. Pease. 2007. Elements of Vadose Zone Hydrology. Invited short course at National Ground Water Association 2007 Ground Water Summit. April 29, 2007, Albuquerque, New Mexico
- Stephens, D.B. 1998. Principles of vadose zone hydrology. Invited presentation to the City of Tucson Office of Environmental Management, March 6, Tucson, Arizona.
- Stephens, D.B. 1997. Principles of vadose zone hydrology. Invited presentation of a two-day short course presented to the New Mexico Environment Department Underground Storage Tank Bureau, October 15-16, Santa Fe, New Mexico.
- Stephens, D.B., T.N. Blandford, A. Lewis. 1997. Hydrogeology short course. Invited presentation to the State of New Mexico, Environment Department, Drinking Water Bureau, April 9, Santa Fe, New Mexico.
- Stephens, D.B. 1996. Principles of vadose zone hydrology. Invited presentation of a two-day short course presented to Westinghouse Savannah River Company, March 27-28, Aiken, South Carolina.
- Stephens, D.B. 1995. Vadose zone processes, characterization and monitoring. Invited workshop at the National Ground Water Association Outdoor Action Conference, May 2-3, Las Vegas, Nevada.
- Stephens, D.B., M.A. Ankeny, J.F. Forbes, and J.A. Havlena. 1995. Vadose zone hydrology: Processes, characterization and monitoring. Short course presented in conjunction with Environmental Education Enterprises, Inc., October 18-20, Albuquerque, New Mexico.
- Stephens, D.B. 1994. Basic concepts in vadose zone hydrology. Workshop at the National Ground Water Association Outdoor Action Conference, May 23-24, Minneapolis, Minnesota.
- Stephens, D.B. and R.S. Bowman. 1994. Principles of vadose zone hydrology. Short course for the National Ground Water Association, June 20-21, San Antonio, Texas.
- Stephens, D.B. 1994. Vadose zone course short course. Ohio University, June 23, Athens, Ohio.
- Stephens, D.B. 1994. Principles of vadose zone hydrology. Invited presentation to Bechtel Corporation, November 1-2, San Francisco, California.
- Stephens, D.B. 1993. Vadose zone characterization of hydraulic properties. Invited presentation at the DOE workshop on Characterization of Glacial Tills, April 15-16, Cincinnati, Ohio.

Presentations and Articles in Symposia Proceedings

- Stephens, D.B., S. Moore, M. Miller, and A Standen. 2009. Is There A Role for Rainwater Harvesting in New Mexico Water Resources Management? Presentation at the 2009 New Mexico Water Research Symposium. August 11, 2009, Socorro, New Mexico.
- Stephens, D.B., L. Jong, A. Standen, S. Moore, and S. Cullen. 2009. Roof Water Harvesting for Artificial Recharge in the Americas. Presentation at the National Ground Water Association Groundwater for the Americas. June 8-10, 2009, Panama City, Panama.



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- Stephens, D.B., A. Simco, K. Calhoun, D. Stephens. 2009. Drainage work at Prisley Bog on the Bedford Estate. Presentation at the National Ground Water Association Ground Water Summit. April 19-23, 2009, Tucson, Arizona.
- Stephens, D.B. 2009. Aquifer Storage and Recovery. Invited presentation at the American Bar Association Section of Environment, Energy and Resources 27th Annual Water Law Conference: *Change in the Midst of Constants: Adapting Water Law to Meet New Demands*, February 18-20, 2009, Coronado, San Diego, California.
- Stephens, D.B. 2009. Vadose Zone Monitoring Strategies for Contaminant Detection and Recharge. Invited presentation at the Groundwater Resources Association of California *Groundwater Monitoring: Design Analysis, Communications & Integration with Decision Making Conference*, February 25-26, 2009, Orange, California.
- Stephens, D.B. and T. Umstot. 2008. Recharge Analyses in a Desert Groundwater Basin. Presentation at the American Water Resources Association Annual Water Resources Conference. November 17-20, New Orleans, Louisiana.
- Umstot, T. and D.B. Stephens. 2008. Distributed parameter modeling of an arid watershed to assess net infiltration. Presentation at the American Water Resources Association Annual Water Resources Conference. November 17-20, New Orleans, Louisiana.
- Stephens, D.B. 2008. A Hydrogeologist's Perspective on Vadose Zone Modeling Challenges. Invited presentation at the Geological Society of America/Soil Science Society of America/Agronomy Society of America/Crop Society of America Joint Meeting. October 5-9, Houston, Texas.
- Stephens, D.B. and T. Umstot. 2008. Recharge Analyses in a Desert Groundwater Basin. Invited presentation at the Geological Society of America/Soil Science Society of America/Agronomy Society of America/Crop Society of America Joint Meeting. October 5-9, Houston, Texas.
- Stephens, D.B. and T. Umstot. 2008. Challenges in characterizing and simulating flow and transport in stony soils. Presentation at the Geological Society of America/Soil Science Society of America/Agronomy Society of America/Crop Society of America Joint Meeting. October 5-9, Houston, Texas.
- Stephens, D.B., J. Burkstaller, M. Miller, M.J. Bitner, M. Wing. 2007. Brackish Groundwater Desalination Overview and Issues. Invited speaker at CLE International Texas Water Law, Houston, Texas. April 23-24, 2007.
- Stephens, D.B. 2007. Recharge of Groundwater Aquifers in Arid Regions. Invited speaker at Kuwait-MIT Center for Natural Resources and the Environment's Forum on Arid Zone Hydrology, January 16-17, 2007, Kuwait.
- Stephens, D.B., S. Moore, D. Cartron, and T.N. Blandford. 2006. Quantifying Return Flow to Groundwater: What's in the Tool Box. Presentation at the National Ground Water Association 2006 Ground Water Summit, April 22-27, San Antonio, Texas.
- Stephens, D.B. 2005. A Perspective on Science and Research in the Environmental Consulting Industry. Invited presentation at the Annual Fall Meeting of the American Geophysical Union. December 4-9, San Francisco, California.
- Stephens, D.B. 2005. Overview of Artificial Recharge Projects: Planning and Implementation Challenges. Invited presentation at the Groundwater Resources Association of California's Artificial Recharge: Nexus of Quantity and Quality in California, March 16-17, Sacramento, California.



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- Stephens, D.B. and T. Neil Blandford. 2004. Hydrogeologic analysis, transport and modeling for environmental litigation, a case study. Presentation at the National Ground Water Association Ground Water and Environmental Law Conference, May 5-6, 2004, Chicago, Illinois.
- Stephens, D.B. 2004. Contaminant Age Dating Using Hydrogeologic Analysis. Invited speaker at the Mealey's Water Contamination Conference, January 26-27, 2004, Pasadena, California.
- Stephens, D.B. 2003. Impact of Hydrogeologic Variables on Contaminant Plume Migration and Forensic Modeling. Invited speaker at the International Society of Environmental Forensics Environmental Forensics: Using Science to Reconstruct Contamination Events, December 8-9, 2003, Taipei, Taiwan.
- Stephens, D.B. 2003. Late eighteenth century hydrogeology: a pre-Darcy perspective. Presentation at the Geological Society of America Annual Conference, November 2-5, 2003, Seattle, Washington.
- Stephens, D.B. 2003. Unexpected field observations and DOE's Vadose Zone Roadmap. Invited speaker at the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America Annual Meetings, November 2-6, 2003, Denver, Colorado.
- Stephens, D.B. 2003. Application of groundwater contaminant transport modeling in environmental forensic investigations: Tucson Airport Superfund Site. Invited speaker at the Workshop on Environmental Forensics: theory, applications and case studies, International Society of Environmental Forensics. May 19-20, 2003, Stresa, Italy.
- Stephens, D.B. 2003. Subsurface considerations of artificial recharge. Invited speaker at Artificial recharge in California—technical and policy challenges, Ground Water Resources Association of California. April 30-May 1, 2003. San Jose, California.
- Stephens, D.B. 2002. Principles and Case Studies of Allocation of Responsibility for Petroleum Contaminated Soil and Groundwater. Invited speaker at Environmental Forensics: Advanced Techniques, an International Society of Environmental Forensics Workshop, September 23-24, 2002, Santa Fe, New Mexico.
- Stephens, D.B. 2002. Principles and Case Studies of Allocation of Responsibility for Petroleum Contaminated Soil and Groundwater. Invited speaker at the Identification and Assessment of Historical Subsurface Contamination: An International Society of Environmental Forensics Workshop, July 1-2, 2002, Milan, Italy.
- Stephens, D.B. and W. Cox. 2001. The Importance of the Vadose Zone in Stream-Aquifer Interaction—Field and Model Studies. Presented by Mark Ankeny on behalf of D.B. Stephens at the American Water Resources Association Annual Conference on Water Resources. November 12-15, 2001. Albuquerque, New Mexico.
- Stephens, D.B. and T. Neil Blandford. 2001. Hydrogeologic Analysis, Transport and Modeling for Environmental Litigation. A Case Study. Presented by Neil Blandford on behalf of D.B. Stephens at the Arizona Hydrological Society Fourteenth Annual Symposium. September 12-15, 2001. Tucson, Arizona.
- Stephens, D.B. and T. Neil Blandford. 2001. Hydrogeologic Analysis, Transport and Modeling for Environmental Litigation. A Case Study. Presentation at the First International Congress on Petroleum Contaminated Soils, Sediments, and Water Analysis, Assessment and Remediation, August 14-17, 2001, London, United Kingdom.
- Stephens, D.B. 2001. Scientific applications of volume, mass and toxicity for cost allocation modeling. Invited speaker at the University of Wisconsin-Madison, Environmental Litigation: Advanced Forensics and Legal Strategies, April 4-5, 2001, San Francisco, CA.
- Stephens, D.B. and S. Kowall. 2000. The DOE Complex-Wide Science and Technology Roadmap: Characterization, Modeling and Simulation of Subsurface Contaminant Fate and Transport. Presentation at the 12th Technical Information Exchange Workshop. November 14-16, 2000. August, Georgia.



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- Stephens, D.B., K. Hsu, M.A. Prieksat, M.D. Ankeny, T.N. Blandford, T.L. Roth, J.A. Kelsey, and J.R. Whitworth. 2000. Review of Porosity Measurements for Water Supply and Water Quality Modeling. Presented by T. Neil Blandford on behalf of D.B. Stephens at the Southwest Focus Ground Water Conference 2000. May 17-18, 2000. Austin, Texas.
- Stephens, D.B. and N.T. Nelson. 2000. Observed natural attenuation of TCA in groundwater. In Proceedings Second International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 22-25, 2000. Battelle Press, Columbus, Ohio.
- Stephens, D.B. 2000. The role of the unsaturated zone in groundwater recharge. Invited speaker at the Innovations in Artificial Recharge: Augmenting Local Groundwater Supplies for the New Millennium, May 4-5, 2000, Ontario, California.
- Stephens, D.B. 2000. Observed natural attenuation of TCA in groundwater. Tenth Annual West Coast Conference on Contaminated Soils and Water, March 20-23, 2000, San Diego, CA.
- Stephens, D.B. 2000. MTBE—gasoline additive in the national spotlight. Invited speaker at the Albuquerque Petroleum Association Meeting, February 28, 2000, Albuquerque, NM.
- Stephens, D.B. 1999. Physical considerations in artificial recharge. Invited presentation at the 22nd Biennial Ground Water Conference, Interconnected Water Supply in California, September 20-21, San Diego, CA.
- Stephens, D.B. 1999. Scientific applications of volume, mass and toxicity for allocating cleanup responsibility. Invited presentation at IBC's Second Annual Executive Forum on Environmental Forensics, June 24-25, 1999, Washington, D.C.
- Stephens, D.B. 1999. Basic theory of flow from surface impounds and dry wells used for artificial recharge. Ninth Biennial Symposium on Artificial Recharge of Groundwater, June 10-12, 1999, Tempe, AZ.
- Stephens, D.B. 1999. Invited panel member of the Southwest Ground Water—critical issues and information needs, U.S. Geological Survey, Tucson, Arizona, March 25.
- Stephens, D.B. 1998. MTBE fate and transport review. Invited presentation and panel member of the 1998 New Mexico Underground Storage Tank Conference, November 17, 1998, Albuquerque, NM.
- Stephens, D.B., W. Cox. 1998. The importance of vadose zone in stream-aquifer interaction: field and model studies. In Proceedings Groundwater Protection Council 1998 Annual Forum, Sacramento, California, September 19-23.
- Stephens, D.B., E. Seay. 1998. Interpretations of mechanical integrity tests and groundwater monitoring data at a salt water disposal well: a case study. In Proceedings Groundwater Protection Council 1998 Annual Forum, Sacramento, California, September 19-23.
- Stephens, D.B. 1998. Scientific applications of volume mass and toxicity for allocating responsibility for aquifer clean-up. Invited presentation at the National Environmental Forensic Conference: Chlorinated Solvent and Petroleum Hydrocarbons, University of Wisconsin-Madison, Department of Engineering Professional Development, Tucson, Arizona, August 27-28.
- Stephens, D.B., J.R. Forbes, M.E. Miller, and J. Minier. 1998. PCE degradation near petroleum contaminated sites. In Proceedings First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 18-21, 1998. Battelle Press, Columbus, Ohio.
- Stephens, D.B. 1997. Case studies in DNAPL delineation, technical infeasibility and remediation cost allocation. Invited keynote speaker at the International Conference on Remedial Technology and Management of Subsurface Contamination, December 1-3, Taipei, Taiwan.
- Stephens, D.B., J.A. Kelsey, M.A. Prieksat, M.G. Piepho, C. Shan, and M.D. Ankeny. 1998. DNAPL migration through a fractured perching layer. Presentation at the Geological Society of America Annual Meeting, October 21, Salt Lake City, Utah.



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- Stephens, D.B. 1997. Infiltration modeling roles in RBCA. Invited presentation and panel member of the 1997 New Mexico Underground Storage Tank Conference, September 9-10, Ruidoso, New Mexico.
- Stephens, D.B. 1996. Borehole permeameter development, applications and limitations. Presentation at American Geophysical Union Fall Meeting, December 15-19, San Francisco, California.
- Stephens, D.B. 1996. Hydrogeology and contaminant transport. Invited presentation at The Who, What, Where & How of Toxic Tort Litigation, The Arizona Bar Association Continuing Legal Education, November 22, Phoenix, Arizona.
- Stephens, D.B., J.A. Kelsey, M.A. Priksat, M.G. Piepho, M.D. Ankeny, and C. Shan. 1996. DNAPL migration in a complex multi-aquifer system. Presentation at Geological Society of America Annual Meeting, October 28-31, Denver, Colorado.
- Stephens, D.B., J.A. Kelsey, M.A. Priksat, M.G. Piepho, M.D. Ankeny, and C. Shan. 1996. DNAPL migration in a complex multi-aquifer system. Presentation at HSRC/WERC Joint Conference on the Environment, May 21-23, Albuquerque, New Mexico.
- Stephens, D.B. 1996. Estimating cleanup costs for purposes of mediation: Achieving finality in face of uncertainty. Invited presentation at Resolving Environmental Disputes Through Mediation conference, University of Wisconsin, May 16-17, Albuquerque, New Mexico.
- Stephens, D.B., J. Minier, and M.E. Miller. 1996. Subsurface migration and transformation of PCE. Presentation at the New Mexico Conference on the Environment, March 12-14, Albuquerque, New Mexico.
- Forbes, J.R. and D.B. Stephens. 1996. Natural biodegradation of subsurface hydrocarbons: Case studies from the southwest United States. Presentation at Bioremediation Technology Transfer Conference, EPA Western Region Hazardous Subresearch Center and Albuquerque Technical Vocational Institute, February 16, Albuquerque, New Mexico.
- Stephens, D.B. 1995. Site characterization, remediation: Better/cheaper/faster. Invited presentation at Los Alamos Environmental Restoration Technical Session, Los Alamos National Laboratory, April 19, Los Alamos, New Mexico.
- Stephens, D.B. 1995. Environmental remediation technology. Invited presentation at New Mexico Water Law Water Rights and Water Quality Issues, August 28-29, Santa Fe, New Mexico.
- Stephens, D.B. 1994. The role of consultants in water rights matters. Presented at Cambridge Institute seminar on New Mexico Water Rights: Key Issues and Recent Developments, March 16, Santa Fe, New Mexico.
- Stephens, D.B. 1994. The significance of saturated hydraulic conductivity and residual water content in predictions of unsaturated transport. Invited presentation at the Soil Physics Workshop on Subsurface Transport at Battelle, March 31-April 1, Richland, Washington.
- Stephens, D.B. and T.N. Blandford. 1994. Hydrogeology short course. Invited presentation to the State of New Mexico, Environment Department, Drinking Water Bureau, December 6-7, Santa Fe, New Mexico.
- Stephens, D.B. and J.C. Stageman. 1993. The consultant's role in addressing environmental risks in real estate and lending. Invited presentation at the Cambridge Institute workshop on Tackling Environmental Issues in New Mexico, September 24, Albuquerque, New Mexico.
- Stephens, D.B. 1993. Designing a vadose zone monitoring system for municipal and hazardous waste landfills. 16th Annual Rocky Mountain Groundwater Conference, September 13-16, Albuquerque, New Mexico.
- Stephens, D.B. 1993. Unsaturated flow and recharge. Invited presentation at the 19th Annual Field Studies in Groundwater Contamination Evaluation in Three Modules, Ohio University, June 25, Athens, Ohio.



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- Stephens, D.B. 1993. Vadose zone processes, characterization, and monitoring. Invited presentation at the National Ground Water Association Outdoor Action Conference, Outdoor Workshops, May 25-27, Las Vegas, Nevada.
- Stephens, D.B. 1992. A comparison of the calculated and measured unsaturated hydraulic conductivity of two uniform soils in New Mexico. *In* M.Th. van Genuchten, F.J. Leij, and L.J. Lund (eds.), Proc. International Workshop on Indirect Methods for Estimating the Hydraulic Properties of Unsaturated Soils, October 11-13, 1989, Riverside, California. University of California, Riverside, California.
- Stephens, D.B. 1992. A hydrogeologist's encounter with geologic problems in New Mexico. Guest lecture at the New Mexico Geological Society Annual Spring Meeting, April 10, Socorro, New Mexico.
- Stephens, D.B. 1992. Vadose zone processes, characterization, and monitoring. Invited presentation at the National Ground Water Association Outdoor Action Conference, Indoor Workshops, May 11-13, Las Vegas, Nevada.
- Stephens, D.B. 1992. Unsaturated flow and recharge. Invited presentation at the 18th Annual Field Studies in Groundwater Contamination Evaluation in Three Modules, Ohio University, June 15-July 3, Athens, Ohio.
- Stephens, D.B. 1992. Encounters with geologic problems in New Mexico. Guest lecture at the AWWA-WPCA (WEA) meeting, July 28, Albuquerque, New Mexico.
- Stephens, D.B. 1992. Characterizing the leaching potential of landfills. Invited presentation at the American Geophysical Union Western Pacific Geophysics Meeting, August 17-21, Hong Kong, China.
- Stephens, D.B. 1992. Cost-effective remediation at UST sites. Presentation at the Cost-Effective Corrective Action session during the New Mexico Conference on the Environment, September 15, Albuquerque, New Mexico.
- Stephens, D.B. 1992. Observation of the effects of heterogeneity on unsaturated flow. Invited presentation at the Remson Symposium, 1992 American Geophysical Union Fall Meeting, December 7-11, San Francisco, California.
- Bowman, R.S., D.B. Jaynes, R.C. Rice, and D.B. Stephens. 1991. Field determination of solute transport parameters in "homogeneous" vs. "heterogeneous" soils. Presented at the ASA-CSSA-SSSA 83rd Annual Meeting, October 27-November 1, Denver, Colorado.
- Havlena, J. and D.B. Stephens. 1991. Vadose zone characterization using field permeameters and instrumentation. *In* Proc. Symp. Ground Water and Vadose Zone Investigation, ASTM, January 30-February 1, San Diego, California.
- Havlena, J.A. and D.B. Stephens. 1991. Vadose zone characterization using field permeameters and instrumentation. *In* D.M. Nielsen and M.N. Sara (ed.), Current practice in ground water and vadose zone instrumentation, ASTM STP 118, American Society for Testing Materials, Philadelphia.
- Stephens, D.B. 1991. Diffuse, natural recharge calculated from field data and comparisons among semiarid sites. Presented at the ASA-CSSA-SSSA 83rd Annual Meeting, October 27-November 1, Denver, Colorado.
- Stephens, D.B. 1991. Characterizing permeability to gas in the vadose zone. Invited presentation at the Symposium on Soil Venting, sponsored by the Robert S. Kerr, Environmental Research Laboratory and the National Center for Ground Water Research, April 29-May 1, Houston, Texas.
- Stephens, D.B. 1991. Vadose zone characterization and monitoring. Invited presentation for the Hazardous/Radioactive Waste Management Videoconference Training Series, Program 5: Site Characterization, June 12, University of New Mexico, Albuquerque, New Mexico.
- Stephens, D.B. 1991. Unsaturated flow and recharge. Invited presentation at the 17th Annual Field Studies in Water Resource and Contamination Evaluation, Ohio University, June 10-28, Athens, Ohio.



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- Stephens, D.B., R.S. Bowman, E. Mattson, A. Parsons, K. Flannigan, R. Schmidt-Petersen, D. Grabka, P. Arnet, and A. Stark. 1991. Long-term three-dimensional infiltration, drainage, and transport in a heterogeneous soil. Presented at the 1991 AGU Fall Meeting, December 9-13, San Francisco, California.
- Stephens, D.B. 1990. Uncertainties in site characterization data. Invited paper, 12th Annual U.S. DOE Low-Level Waste Management Conference, August 28, Chicago, Illinois.
- Beach, J.A., D.B. Stephens, and A.L. Gutjahr. 1989. Incorporation of spatial variability in mill tailings hydraulic properties into numerical models: Implications for uncertainty in seepage prediction and ground water protection. Ninth Annual AGU Front Range Branch Hydrology Days, April 17-21.
- Bowman, R.S., D.B. Stephens, D.P. Grabka, K.G. Flannigan, and Department of Geoscience, New Mexico Institute of Mining and Technology. 1989. A multi-tracer field experiment to evaluate solute transport in variably saturated soils. Tracers in Hydrogeology: Principles, Problems, and Practical Applications, National Water Well Association Conference, October 31-November 1, Houston, Texas.
- Parsons, A.M., E.D. Mattson, D.B. Stephens, K. Flannigan, and K. Black. 1988. Field simulation of waste impoundment seepage in the vadose zone. In Proc. FOCUS on Southwestern Groundwater Issues Conference, National Water Well Association, March 23-25, Albuquerque, New Mexico.
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- McCord J.T., D.B. Stephens, and J.L. Wilson. 1988b. Field-scale unsaturated flow and transport in a sloping, uniform porous media: Field experiments and numerical simulation (Abs). International Conference and Workshop on Validation of Flow and Transport Models for the Unsaturated Zone, Poster Session, May 22-25, Ruidoso, New Mexico.
- Stephens, D.B., A.M. Parsons, E.D. Mattson, K. Black, K. Flannigan, R.S. Bowman, and W.B. Cox. 1988. A field experiment of three-dimensional flow and transport in a stratified soil. p. 401-413. In P.J. Wierenga and D. Bachelet (eds.), Proc. International Conference and Workshop on Validation of Flow and Transport Models for the Unsaturated Zone, May 22-25, Ruidoso, New Mexico. New Mexico State University, Las Cruces.
- Stephens, D.B., J.T. McCord, R.G. Knowlton, Jr., B. Kickham, E. Hicks, and T. Stein. 1988. Three-dimensional soil-water flow in semi-arid terrain (Abs). International Conference on Advances in Groundwater Hydrology, November 16-18, Tampa, Florida.
- McCord, J.T. and D.B. Stephens. 1987. Infiltration and recharge on a sandy hillslope in an arid climate. International Conference on Infiltration Development and Application, University of Hawaii, January 6-9, Manoa, Hawaii.
- Stephens, D.B. 1987. Processes affecting the movement and fate of pesticides in soil and groundwater. New Mexico Environmental Improvement Division, May 27, Santa Fe, New Mexico.
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Daniel B. Stephens, Ph.D., P.Hg., P.G.

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Other Publications

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- Stephens, D.B. and C. Spaulding. 1984. Oil-field brine contamination: A case study, Lea County, New Mexico. *In* W.J. Stone, Selected papers on water quality and pollution in New Mexico, Bureau of Mines and Mineral Resources, Hydrologic Report 7.



Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens, Ph.D., P.Hg., P.G.
Qualifications Statement

I am qualified to present expert testimony on the general topics of hydrogeology, vadose zone processes, groundwater recharge, and contaminant fate and transport.



Daniel B. Stephens & Associates, Inc.

**Daniel B. Stephens, Ph.D., P.Hg., P.G.
List of Relevant Publications**

Books and Chapters of Books

- Stephens. 2008. Vadose Zone Hydrogeology: Basic Principles, Characterization, and Monitoring, Chapter 12, *In* Manual of Applied Field Hydrogeology, second edition, Willis Weight, editor. McGraw-Hill, New York.
- Stephens, D.B. 1999. Monitoring for Groundwater Management in (Semi-) Arid Regions. Chapter 4, *In* Vadose Zone Monitoring Strategy to Protect Aquifers from Contamination, UNESCO, Wageningen, The Netherland.
- Stephens, D.B. 1996. Vadose Zone Hydrology. CRC Press, Boca Raton, Florida.
- Stephens, D.B. 1993. Hydraulic conductivity assessment of unsaturated soils. In D.E. Daniels and S.J. Trautwein (Eds.), Hydraulic Conductivity and Waste Contaminant Transport in Soils, ASTM STP 1142, American Society for Testing and Materials, Philadelphia, Pennsylvania.
- Stephens, D.B. 1992. Application of the borehole permeameter. Chapter 4 *In* Advances in Measurement of Soil Physical Properties: Bringing Theory into Practice. SSSA Special Publication No. 30, Soil Science Society of America, Madison, Wisconsin.

Articles in Professional Journals

- Simco, A., D.B. Stephens, K. Calhoun, and D.A. Stephens. 2009. Historic Irrigation and Drainage at Priestley Farm by Joseph Elkington and William Smith. *Vadose Zone Journal* (published on-line September 13, 2009).
- Stephens, D.B. 2009. J.D. Mather (ed.), Book review: 200 Years of British Hydrogeology, The Geological Society, London, 2004. *Hydrogeology Journal* (published on-line June 23, 2009).
- Stephens, D.B. 2009. An Imminent Human Resource Crisis in Ground Water Hydrology? *Ground Water* 47(2): 176-183. March - April 2009.
- Stephens, D.B. 2009. Also consider the recharge. Technical commentary. *Ground Water* 47(1):2-3. January - February 2009.
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Daniel B. Stephens & Associates, Inc.

**Daniel B. Stephens, Ph.D., P.Hg., P.G.
List of Relevant Publications**

- Stephens, D.B., K.C. Hsu, M.A. Prieksat, M.D. Ankeny, T.N. Blandford, T.L. Roth, J.A. Kelsey, and J.R. Whitworth. 1998. A comparison of estimated and calculated effective porosity. *Hydrogeology Journal* 6:156-165.
- Stephens, D.B. and C. Shan. 1995. An analytical solution for vertical transport of volatile chemicals in the vadose zone. *Journal of Contaminant Hydrology* 18:259-277.
- Shan, C. and D.B. Stephens, 1995. Steady infiltration into a two-layered soil from a circular source. *Water Resources Research*, 31(8):1945-1952.
- Shan, C. and D.B. Stephens. 1994. Recommendation for usage of SURFER to gridding model results. *Ground Water* 32(3).
- Stephens, D.B. 1994. A perspective on diffuse natural recharge mechanisms in areas of low precipitation. *Soil Science Society of America Journal* 58(1):40-48.
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- Shan, C. and D.B. Stephens. 1993. A borehole field method to determine unsaturated hydraulic conductivity. *Water Resources Research* 29(8):2763-2769.
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- Stephens, D.B. and R. Knowlton, Jr. 1986. Soil water movement and recharge through sand at a semi-arid site in New Mexico. *Water Resources Research* 22(6):881-889.



Daniel B. Stephens & Associates, Inc.

**Daniel B. Stephens, Ph.D., P.Hg., P.G.
List of Relevant Publications**

- Stephens, D.B. and K. Rehfeldt. 1985. Evaluation of closed-form analytical models to calculate unsaturated conductivity in a fine sand. *Soil Sci. Soc. Am. J.* 49(1):12-19.
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- Hawkins, D.C. and D.B. Stephens. 1983. Ground water modeling in a southwestern alluvial basin. *Groundwater* 21(6):733-740.
- Byers, E. and D.B. Stephens. 1983. Statistical and stochastic analysis of hydraulic conductivity and particle size in a fluvial sand. *Soil Sci. Soc. Amer. Proc.* 47(6):679-688.
- Person, M., R. Antle, and D.B. Stephens. 1983. Evaluation of the surface impoundment assessment in New Mexico. *Ground Water* 21(6):679-688.
- Stephens, D.B. 1983. Groundwater flow and implications for groundwater contamination north of Prewitt, New Mexico, USA. *J. Hydrology* 61:391-408.
- Stephens, D.B. and S.P. Neuman. 1982. Vadose zone permeability tests 1: Review. *ASCE J. Hydraulics Division* 108 (HY5):623-639.
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- Stephens, D.B. and S.P. Neuman. 1982. Free surface and saturated-unsaturated analysis of borehole infiltration tests above the water table. *Advances in Water Resources* 5:111-116.

Other Publications

- Stephens, D.B., P. Johnson, and J. Havlena. 1996. Estimation of infiltration and recharge for environmental site assessment. American Petroleum Institute publication number 4643.
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Daniel B. Stephens, Ph.D.
Expert Testimony in the Previous Four Years

Expert Testimony

A&M Engineering and Environmental Services, Inc., vs. FMRI, Inc., and Penn Environmental & Remediation, Inc.

U.S. District Court of Oklahoma County, Oklahoma

No. CJ-2006-04430

Deposition

ITT Corporation v. Borgwarner, Inc. Kuhlman Corporation; Bronson Specialties, Inc. and Royal Oak Industries, d/b/a Bronson Precision Products and Scott Fetzer Company/Borgwarner, Inc., Kuhlman Corporation, Bronson Specialties, Inc., Royal Oak Industries d/b/a Bronson Precision products v. LA Darling Company

U.S. District Court for the Western District of Michigan Southern Division

Case No. 1:05-CV-0674

Deposition and Trial

Rebuttal testimony in the matter of the application of the New Mexico Oil Conservation Division for repeal of existing rule 50 concerning pit waste management and adoption of new rules governing pit waste management

Case No. 14015

Hearing Testimony

American Arbitration Association

TRE Management Company, et al., Claimants v. Halliburton Energy Services, et al.,
Respondents

Case No. 51 198 00230 06

Deposition & Hearing Testimony

U.S. District Court for the District of New Mexico

Rio Algom Mining LLC v. Tronox Worldwide LLC

Case No. CIV-06-0052

Deposition

U.S. District Court, Central District of California, Western Division

Case No. CV 04-00079 PSG (SSx)

City of Rialto et al., vs. U.S. Department of Defense, et al.

Depositions



Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens, Ph.D.
Expert Testimony in the Previous Four Years

CPR Institute for Dispute Resolution
Tesoro Refining and Marketing Company vs. Tosco Corporation
Deposition

Superior Court of the State of California, County of San Diego, Northern Division
Kenneth Perea and Parletta Perea vs. Ranch Santa Fe Community Services District;
Santa Fe Irrigation District; et al. Case No. GIN041328
Deposition

District Court of Wilson County, Kansas
City of Neodesha, Kansas et al., vs. BP Corporation, North America. Case No. 2004-CV-19.
Depositions & Trial Testimony

Superior Court of the State of Arizona in and for the County of Maricopa
Nick Wilson and Elayne Wilson, et al., vs. Fulton Homes Corporation,
Case No. CV 2002-001977
Deposition

JANE SUMMERSON

Jane Rockwell Summerson (Sutter, Stockey)
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Las Vegas, Nevada, 89149
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Education

Ph.D., Geology, The George Washington University, 1991
M.S., Geobiology, The George Washington University, 1985
Ph.D candidate, Anthropology, The Ohio State University, 1980
M.A., Anthropology, The Ohio State University, 1978
B.A., Anthropology, The Ohio State University, 1977

Work Experience

2006 - Present: Repository Supplemental Environmental Impact Statement (SEIS) Project Manager, and Office of Civilian Radioactive Waste Management (OCRWM) National Environmental Policy Act (NEPA) Compliance Officer (NCO). As NCO provides advice, guidance, direction and oversight for all NEPA requirements and issues at the Yucca Mountain Project, coordinated and integrated with OCRWM HQ. Is responsible for developing the NEPA related aspects of OCRWM strategic and implementation plans to satisfy OCRWM strategic goals and objectives. Coordinates, manages and monitors document preparation for YMP that ensures that on-going and planned site activities comply with Council on Environmental Quality (CEQ) and DOE regulations that implement NEPA and other environmental regulations. As SEIS Project Manager, advises the Director in developing policies, goals and objectives related to NEPA and the mission-critical SEIS; guides the development of the mission-critical SEIS that analyzes a proposal to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain. In this role, is responsible for ensuring consistency with an in-preparation application for Construction Authorization to the Nuclear Regulatory Commission (NRC) for the construction of the geologic repository. Also serves as Document Manager for the Office of Logistics Management's Rail Line Project Draft EIS, being prepared being prepared in parallel, and assists in the development and review of budget assumptions, submissions and program guidance for that office. Represents OCRWM as the NEPA lead with senior level personnel from organizations within DOE such as Nuclear Energy (Global Nuclear Energy Partnership Programmatic EIS), Environmental Management, (the Greater-than-Class-C Low-Level Waste Programmatic EIS), and General Counsel. Also represents OCRWM as the NEPA lead for public hearings, NEPA lead for the Nuclear Regulator Commission, the Affected Units of Local Government, tribal nations, the Advisory Committee on Nuclear Waste, and the Nuclear Waste Technical Review Board. Represents OCRWM as NEPA lead with senior level personnel from other Federal Agencies such as the Bureau of Land Management. Acts as COR for two contracts in support of NEPA efforts, including defining requirements, developing guidance and technical direction, and monitoring the adequacy and completeness of records, calculation packages and associated NEPA/EIS documents.

2004-2006: Waste Form Lead, NCO. Managed waste form work in support of the in-preparation application for Construction Authorization (LA) for a geologic repository at Yucca Mountain. Provided oversight of geochemistry research program and investigations located at several national labs, reviewed testing results and their relationship to general geology, hydrology and radiological health physics, and provided oversight for their incorporation, as appropriate, in the design, engineering and waste management system evaluated in the LA. Managed the review process and commented on draft SAR sections related to the waste form; ensured consistency with appropriate NRC regulatory requirements.

As NCO, responsible for ensuring that on-going and planned site activities comply with Council on Environmental Quality (CEQ) and DOE regulations that implement NEPA. Managed preparation and implementation of a Project procedure that melded regulatory requirements with elements of the Nuclear Waste Policy Act to ensure compliance. Also initiated preparation of an environmental analysis to compare and contrast the changes in environmental consequences from the design considered in the Final EIS (see **2001-2002** below) to the design to be included in the LA (the environmental analysis was superseded by the SEIS).

2003-2004: Infrastructure Team Lead, Infrastructure Planning Lead, NCO. Supervised the Infrastructure Team in maintaining existing infrastructure (buildings, vehicles, equipment, and operating systems such as roads and power networks) for the Yucca Mountain Project. Led multidisciplinary team of Federal staff and contractors to evaluate and develop requirements and plans for the infrastructure required to construct a geologic repository at Yucca Mountain. Responsible for ensuring that ongoing and planned site activities comply with CEQ and DOE regulations that implement NEPA.

2001-2002: Document Manager for Final EIS. Managed preparation of OCRWM's Supplement to the Draft Environmental Impact Statement and Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. Managed the public comment process ensuring appropriate responses to more than 11,000 comments received on the Draft EIS, as well as updating technical and policy aspects in preparing the Final EIS. Careful coordination with the development of the Site Recommendation and its supporting documents was necessary to ensure integration and consistency while meeting schedule.

1995-2000: Project Planning Lead and Coordinator. Provided guidance and direction for highly complex project planning and control, budgeting, and financial management. Developed and implemented a Project wide, risk-based prioritization process for planning, which incorporated the Integrated Safety Management System; responsible for planning integration (federal and contractor) for the entire Yucca Mountain Project which required the ability to technically evaluate, analyze and integrate multidisciplinary activities. Responsible for integrating project planning with the Federal Budget Process. Led a contractor team in performing an independent risk evaluation for the Yucca Mountain Project.

1994-1995: Team Lead for Site Suitability Evaluation of Yucca Mountain. Team Lead for the Site Suitability Team, developed and implemented a process for public and peer review of documents supporting the technical basis for a Departmental decision on the suitability of Yucca Mountain for a geologic repository. Managed a National Academy of Sciences peer review of Project technical work, which completed on-time and within budget.

1990-1994: Headquarters technical staff and liaison with Yucca Mountain Project Office. Contract Officer Technical Representative for the United States Geological Survey (USGS).

Honors

NEPA Special Achievement Award – DOE General Counsel 2008

Award - Superior Job Performance 1991-2001, 2003-2007

Award - Special Act or Service 1990, 1992, 1995, 1996, 2000-2002, 2004, 2005, 2007

Employee of the Quarter 2001

Publications

Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. U.S. Department of Energy Office of Civilian Radioactive Waste Management, DOE/EIS-0250F-S1, 2008.

Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada – Nevada Rail Transportation Corridor, DOE/EIS-0250F-S2, and Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada, DOE/EIS-0369. U.S. Department of Energy Office of Civilian Radioactive Waste Management, 2008.

Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. U.S. Department of Energy Office of Civilian Radioactive Waste Management, DOE/EIS-0250F, 2002.

Stockey (Summerson), J. R. and McLellan, E. L., 1992. Fluid interaction and deformation, the Brevard Shear Zone, Rosman, North Carolina. 7th International Symposium on Water-Rock Interaction. International Association of Geochemistry and Cosmochemistry.

Stockey, J. R. and Sutter, John F., 1991. $^{40}\text{Ar}/^{39}\text{Ar}$ Thermochronologic evidence for late Paleozoic deformation in the Brevard Zone and surrounding region near Rosman, N. C. Geological Society of America Abstracts with Programs, Northeast Section.

Stockey, J. R., Criss, R. E., and McLellan, E. L., 1990. Oxygen isotope and fluid inclusion evidence for the environment of Late Paleozoic metamorphism and deformation, Brevard Zone, Rosman, North Carolina. Geological Society of America Abstracts with Programs, 22:7 pA142.

Stockey, J. R., and McLellan E. L., 1989. Localization of strain and variation in deformation mechanisms in the Henderson Augen Gneiss, Brevard Zone, N. C., Geological Society of America, Southeast Section.

Stockey, J. R., and McLellan, E. L., 1989. The use of fluid inclusions as a petrographic tool in polymetamorphic and deformed rocks. Pan American Conference on Fluid Inclusions II, Program Abstracts, p63, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Stockey, J. R., and McLellan, E. L., 1988. Correlation of fluid inclusion populations from the Henderson Augen Gneiss, Brevard Zone, Rosman, N.C., Geological Society of America Abstracts with Programs, 20:7 pA332.

Stockey, J. R., Criss, R., and Sinha, A. K., 1987. ^{18}O and geochemical evidence for fluid/rock interaction during mylonitization, Brevard Fault Zone, Rosman, N.C., Geological Society of America Abstracts with Programs 19:7, p856.

Training

Performance Based Statements of Work, 8/2007

Using the Green Book to Avoid NEPA Pitfalls, 10/1006

DOE Supplement Analysis Process, 10/2006

Bottom-Line Project Leadership, Advanced, 2006

Project Management Professional Boot Camp, 2005

COR/COTR Refresher Training, 2005

Contract Administration for Tech Reps, 2003

Human Resources Management, DOE, 2002

How to Manage the NEPA Process, 2001

Mastering NEPA, 2001

Leadership Skills for Non-supervisory Staff, 2000

Project Planning, 1997

Best Practices in DOE Project Management, 1996

Program Planning, 1996

Contract Officer Representative, 1992

Geo-hydrology, 1991

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September 2009

Summary

Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM

Chief Scientist for the Department of Energy Office of Civilian Radioactive Waste Management's Lead Laboratory for Repository Systems, Las Vegas, NV

Deputy Director, Used Fuel Disposition Campaign, U.S. Department of Energy Office of Nuclear Energy Fuel Cycle Research and Development Program

Twenty years experience in transuranic and high-level radioactive waste disposal programs

Ph.D. in Geosciences, University of Arizona

Professional experience

Radioactive Waste Disposal Programs

October 2006 - present, Chief Scientist for the Department of Energy Office of Civilian Radioactive Waste Management's (DOE-OCRWM) Lead Laboratory for Repository Systems and Distinguished Member of the Technical Staff, Sandia National Laboratories (SNL).

Senior technical advisor to the Yucca Mountain Project Lead Laboratory Program Manager regarding adequacy and completeness of technical work supporting the Yucca Mountain project. Represent scientific activities supporting the national high-level waste disposal program to senior DOE management and external groups including the Nuclear Regulatory Commission (NRC), Nuclear Waste Technical Review Board (NWTRB), and the national and international peer community.

August 2009 – present, Deputy Director, Used Fuel Disposition Campaign, U.S. Department of Energy Office of Nuclear Energy Fuel Cycle Research and Development Program

Provide technical leadership and project management for DOE-NE campaign to identify alternatives and conduct scientific research and technology development to enable storage and disposal of used nuclear fuel and wastes generated by existing and future nuclear fuel cycles.

April - September 2008, Member of the Independent Expert Review Team (IERT) for the Draft Environmental Impact Statement for the West Valley Demonstration Project, New York.

Lead within the IERT for review of uncertainty and sensitivity analyses in the West Valley Long-Term Performance Assessment. The IERT was a ten-member panel convened by the New York State Energy Research and Development Authority to provide independent review of preliminary

drafts of the DOE's draft environmental impact statement for the West Valley facility.

April 2006 - September 2006, Chief Scientist for SNL Yucca Mountain Transition Team.

Provided scientific leadership to the SNL team during the transition of repository postclosure science programs for the Yucca Mountain Project from the Bechtel SAIC Company (BSC) to SNL.

December 2000 - April 2006. Manager, Total System Performance Assessment Department, SNL, Albuquerque, NM, and Total System Performance Assessment Department Manager, BSC, Las Vegas, NV (March 2004-April 2006), Performance Assessment Strategy and Scope Subproject Manager, BSC (December 2001-March 2004), Total System Performance Assessment Process Model Report Manager, BSC (February 2001-December 2001).

At SNL, manager for approximately 15 technical staff members working on total system performance assessment for radioactive waste repositories. Within BSC, manager for approximately 50-60 technical and administrative personnel, management responsibility for designing, conducting and documenting total system performance assessment analyses for the Yucca Mountain license application, also management responsibility for analyses to identify and prioritize scientific and engineering work needed to support analyses of long-term performance of the proposed Yucca Mountain repository. Technical spokesperson for the Yucca Mountain project in interactions with DOE, NRC, NWTRB, and various other US and international groups.

June 2000 - February 2001. Deputy Department Manager-Albuquerque, Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) Performance Assessment Department, Yucca Mountain Project, USA, and Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Primary responsibility for technical work performed by the Albuquerque, NM staff of the CRWMS M&O Performance Assessment Department. Staff included approximately 35 technical and support personnel at SNL and Duke Engineering and Services, Albuquerque.

September 1998 - December 2000. Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Member of the CRWMS M&O Performance Assessment Department. Lead for modeling of consequences of disruptive events, including volcanism and seismicity, in the total system performance assessment for DOE's Yucca Mountain Project, 1999-2000. Lead for scenario development and screening of features, events, and processes, 1998-1999. Participated in technical exchanges with CRWMS M&O, DOE, and NRC staff on scenario development and disruptive events. Represented the DOE's approach to scenario development for performance assessment internationally.

October 1997 - September 1998. Principal Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Lead for scenario development methodology for the Yucca Mountain Project total system performance assessment. Active in developing new business opportunities for SNL within the USA and internationally. Member of the Waste Isolation Pilot Plant (WIPP) Technical Integration and Compliance Departments. Lead for WIPP compliance application documentation, co-lead for far-field technical activities (site-related geology and hydrology).

September 1993 - October 1997. Senior Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Member of the Waste Isolation Pilot Plant (WIPP) Performance Assessment and Technical Integration and Compliance Departments. Team Leader for Compliance Documentation. Acting Manager of the WIPP Compliance Department, January - March 1995. Acting Manager of WIPP Compliance Support Department, December 1994.

Lead responsibility for preparing contributions by SNL (Scientific Advisor for the WIPP) to the WIPP Compliance Certification Application, submitted to the U.S. Environmental Protection Agency (EPA) in October, 1996, and the No-Migration Variance Petition, submitted to the EPA in June, 1996. Integrated WIPP long-term performance assessment with SNL technical program and regulatory compliance activities coordinated by the DOE and Westinghouse Waste Isolation Division. Participated in regulator and stakeholder interactions with the DOE, EPA, the State of New Mexico, the National Academy of Sciences, international review groups, and public groups. Represented WIPP Project to international technical audiences.

November 1989 - September 1993. Scientist III, Tech Reps, Inc., Albuquerque, New Mexico.

Contract member of the Performance Assessment Department at SNL evaluating compliance of the WIPP with EPA long-term regulations. Task leader for geology and climate-related studies and coordinator of technical documentation. Work included analysis of long-term climate variability at the WIPP and conceptual application of climatically-varying recharge to regional groundwater-flow model.

Mineral Exploration

July 1987 - August 1989. Exploration Geologist, Chevron, U.S.A., Denver and Houston.

Developed new oil and gas prospects and contributed to the structural analysis and seismic interpretation of existing prospects in southern Oklahoma. Served on a nine-member committee that assessed the teaching and practice of structural geology throughout the corporation.

April 1975 - July 1979. Various field operations in uranium exploration, Geomet Exploration, Inc., Boulder, Co, and North Park Uranium Associates, Rand, Colorado.

As staff member and later project leader for uranium exploration programs, participated in and directed radiation surveys at regional and local scales, directed claim-staking projects, and managed the field operations of two- to ten-person crews throughout the western United States.

Academic Teaching and Research

January 1996 - May 1996 and January 1997 - May 1997. Instructor, Department of Civil Engineering, University of New Mexico, Albuquerque.

Co-taught two one-semester graduate courses in radioactive waste management, with Dr. Ruth Weiner.

August 1989 - December 1989. Instructor, Department of Geology, University of New Mexico, Albuquerque.

Taught a one-semester graduate seminar on basin analysis and sedimentary tectonics.

June 1980 - May 1987. Teaching Assistant and Research Aide for the Department of Geology and Geophysics, University of Wyoming; Teaching Associate and Research Associate for the Department of Geosciences, University of Arizona.

Taught undergraduates in mineral deposits, petroleum geology, structural geology, geophysics, and field methods. Conducted research in topics including uranium exploration and global tectonics.

Education

University of Arizona, Tucson, Arizona
Ph.D., Geosciences, tectonics program, May, 1987
University of Wyoming, Laramie, Wyoming
M.S., Geology, May, 1982
B.S., with honors, Geology, December, 1980
Yale University, New Haven, Connecticut
B.A., English, May, 1974

Professional Associations

American Geophysical Union, Geological Society of America, American Association for the Advancement of Science.

Publications and Presentations

Technical Reports

Garrick, B. J., J. T. Bell, S.J. Bennett, R.H. Fakundiny, S.P. Neuman, F.L. Parker, M.T. Ryan, P.N. Swift, C.G. Whipple, and M.P. Wilson, 2008. *Independent Review of the Draft Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center*, prepared by the Independent Expert Review Team for the New York State Energy Research and Development Authority, West Valley New York.

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CRWMS M&O 2000. *Total System Performance Assessment for the Site Recommendation*. TDR-WIS-PA-00001 REV 00, ICN 01. Las Vegas, Nevada: Civilian Radioactive Waste Management System Management and Operating Contractor (contributing author).

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Nutt, W.M., M.T., Peters, and P.N. Swift, 2007. "Advanced Fuel Cycles and Impacts on the Yucca Mountain Repository," *proceedings of WM '07, February 25-March 1, 2007, Tucson, AZ*.

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