Richard J. Abitz 1

Education and Training

B.A., Geology, Humboldt State University, Arcata, California; 1981
M.S., Geology, University of New Mexico, Albuquerque; 1984
Ph.D., Geology, University of New Mexico, Albuquerque; 1989
Environmental Risk Assessment Communication and Application Workshop, INEL Oversight Program, Boise, Idaho; 1992
OSHA HAZWOP Training, 29 CFR 1910.120 (40 hours, IT Corporation, 1994)
Practical Models Supporting Remediation of Chlorinated Solvents, Aiken, SC 2010

Experience and Background

2009 - present

Program Manager, Savannah River National Laboratory, Aiken, SC

- Dr. Abitz leads the DOE EM-44 site-wide program to investigate and develop technologies for the *in situ* decommissioning of highly contaminated nuclear facilities. He also supports EM-32 technology development for the remediation of contaminated groundwater and soil across the DOE complex. His knowledge in these areas has been extended into international nuclear clean-up programs in the United Kingdom and Japan, where he interfaces and collaborates with international scientists and engineers on innovative technologies for the safe and effective decommissioning of highly contaminated nuclear facilities and the removal or immobilization of radionuclides in the environment.

2006 - present

Principal Geochemist/Owner, Geochemical Consulting Services, Blue Ash, Ohio

Geochemical Expert on ISL Uranium Mining for the Navajo & Sioux Nations, Coloradoans Against Resource Destruction (CARD), the Goliad County Groundwater Conservation District (GCGCD), and the National Resources Defense Council, Inc.(NRDC)

- Dr. Abitz provides legal testimony, technical review, geochemical modeling, and geological analysis for work associated with the proposed *in situ* uranium leach mines in the vicinity of Church Rock and Crownpoint, New Mexico (Navajo Nation), the expansion of the Crow Butte mine in Nebraska (Sioux Nation), the Centennial Project in Weld County, Colorado (CARD), the Goliad Project near Goliad, Texas (GCGCD), and the Ross Project in Crook County, Wyoming (NRDC).

Technical Support to the Savannah River Site

- Dr. Abitz supported the contract transition team for Savannah River Nuclear Solutions (SRNS). He reviewed RCRA and CERCLA groundwater remedial systems (electrical resistivity heating with soil vapor extraction, chemical reactive barrier, and tritium phytoremediation), project controls and management systems used to status the remediation work, and regulatory milestones to assess the status of the Area Closure Projects and SRNS readiness to perform the work scope. He

also supported SRNS in the preparation of the ARRA baseline estimate for the Solid Waste Management and Area Closure Projects.

NESHAP Report for the Fernald Preserve, Cincinnati, Ohio

- For the Fernald Annual Sitewide Environmental Report, Dr. Abitz prepares the chapters on air emissions (particulate with uranium, thorium and radium isotopes, and radon), population dose, and the NESHAP annual report.

Risk Assessment for the Fernald Closure Project (FCP), Cincinnati, Ohio

- Tasked with the responsibility to develop and author the Interim Residual Risk Assessment for the Fernald site, Dr. Abitz evaluated the risk to visitors and workers exposed to residual contaminants in air, soil and surface-water pathways. Risk scenarios showed the incremental lifetime cancer risk to the receptors was below the recommended EPA maximum of 0.0001.

2003 – 2006 ***Manager of the Environmental Services Group and Senior Consultant, Fluor Fernald, Inc., Cincinnati Ohio***

- As the manager for the Environmental Services Group (ESG), Dr. Abitz oversaw the work of over 50 scientists and technicians. Personnel in the ESG performed water, soil and air sampling and monitoring; analytical services for radionuclides, metals and organic compounds; data verification, validation, reduction and reporting; and *in situ* soil activity measurements for ^{226}Ra, ^{232}Th, and ^{238}U via the site's real-time instrument measurement program (RTIMP).

- As the site geochemist, he prepared an estimate of the curie inventory for the OSDF to provide a baseline value to DOE legacy management. The scope of this task was to develop the estimate using information from the Ohio Field Office Recycled Uranium Project Report, OU3 and OU5 RI/FS documents, the Fernald Dosimetry Reconstruction Project, remedial operation records, historic records, active monitoring data, interviews with technical personnel who supervised plant operations from the early 1960's through production shut down in 1989, and analytical results on soil placed in the OSDF.

- Dr. Abitz also served as senior consultant to the FCP on the long-term remediation strategy for the Great Miami aquifer. In this capacity, he coordinated laboratory and microscopy studies on the form of uranium present on aquifer sediments. The laboratory and microscopy studies examined the amount of uranium that is fixed to the sediments via chemical adsorption and overgrowth rims versus the mobile fraction that is readily desorbed from the aquifer matrix. These key studies identified and addressed the kinetics of uranium reactions to determine the time constraints associated with achieving the EPA's drinking water standard for uranium.

Environmental Science Manager/Project Manager/Senior Consultant, Fluor Fernald,

1998 - 2003 ***Inc., Cincinnati, Ohio.***

- In his role as environmental science manager, Dr. Abitz directed the RTIMP, which provided *in situ* soil activity measurements for ^{226}Ra, ^{232}Th, and ^{238}U in live time. This program supports excavation and D&D work by scanning soil to confirm U contamination is below the waste acceptance criteria for Fernald's on-site disposal facility (OSDF). Prior to the release of remediated land, the RTIMP performs *in situ* activity measurements to demonstrate that the soil is below the final remediation levels established for ^{226}Ra, ^{232}Th, and ^{238}U.

- As a project manager, Dr. Abitz managed a remediation budget of six million dollars for Title I/II design work for D&D of structures and removal of all contaminated soil and subgrade structures within the former Production Area. Dr. Abitz lead a team of engineers and scientists who integrated the remedial design with regulatory issues, sampling and analysis plans, waste management operations, demolition and construction activities, health and safety issues, radiological controls, and quality assurance protocols.

- Dr. Abitz served as a senior consultant to the DOE Technology Development Program, where he performed technical oversight of several university studies dealing with the mobilization of uranium and its removal from groundwater. He was active with laboratory investigations that examine the distribution of uranium phases in soil and aquifer sediment, the leaching behavior of the uranium phases, the treatment of contaminated soil with phosphate, and the geochemical properties of aggregate materials used to construct liners in the OSDF. The research established important baseline information on the distribution of uranium in the aquifer and in OSDF construction materials, while treatment studies evaluated the effectiveness of phosphate in reducing the solubility and mobility of uranium in the disposal cell.

- As a participant in research that evaluated the natural attenuation of uranium using a combination of passive inorganic and organic systems, Dr. Abitz was involved with work groups from industry, academia and DOE laboratories. The inorganic systems that were investigated include rip-rap channels constructed with rock containing iron oxyhydroxide phases (e.g., goethite and hematite) or phosphate minerals (e.g., apatite) and flow-through cells using zero-valent iron. Organic systems that showed potential promise include sulfate-reducing bacteria, microbial mats, lichen, and phytoextraction. A combination of these systems may prove to be practical and cost effective in the treatment of low leachate volumes.

President/Owner, Geochemical Consulting Services, Albuquerque, New Mexico.
Dr. Abitz served as a geochemical consultant to the Fernald Environmental Management
1997 - 1998 Program (FEMP) and the WIPP Project.

- Dr. Abitz performed confidential work for the Navajo Nation on the proposed *in*

situ uranium leach mines in the vicinity of Church Rock and Crownpoint, New Mexico.

- At FEMP, he evaluated the efficiency of selected alternatives for soil and groundwater remediation, including soil washing and *in situ* uranium leaching methods. This effort involved supervising the technical team, assisting in the negotiation of clean-up levels with DOE and EPA, developing soil-treatment protocols, and interacting with public-interest groups.

- At the WIPP site, Dr. Abitz provided the operating contractor with expertise in the area of brine geochemistry. He was responsible for oversight of laboratory analyses and QA/QC, data analysis, and geochemical interpretation of the composition and origin of fluids in the vicinity of underground operations. Dr. Abitz also evaluated the solubility of transuranic elements in sodium-chloride brine and in brine containing organic-complexing agents such as citric acid, oxalic acid, and EDTA.

1994 - 1997

Project Manager/Senior Staff Consultant, IT Corporation, Albuquerque, New Mexico. Dr. Abitz served as project scientist/manager on geochemical tasks associated with the WIPP Project, Norton AFB Groundwater Study, FEMP Operable Units 5 and 3 RI/FS, and Navajo EPA. Specific activities include:

- Conducted a rerun of the chemical compatibility analysis of TRU waste forms and container materials for Appendix C1 of the WIPP RCRA Part B permit. The chemical compatibility analysis was carried out with all defense generated, contact-handled (CH) and remote-handled (RH) transuranic-mixed waste streams reported in the 1995 WIPP Transuranic Waste Baseline Inventory Report (WTWBIR). Chemicals reported by the generator sites were classified into reaction groups as defined by the U.S. Environmental Protection Agency (EPA) document "A Method for Determining the Compatibility of Hazardous Wastes." The list of potential chemical incompatibilities reported by the program was hand checked using the EPA document as a reference to assure proper functioning of the program. All potential chemical incompatibilities were then evaluated on a case-by-case basis to identify which of the reactions could occur, given the nature of the waste, its chemical constituents, and final waste form.

- Assisted in evaluating the geochemical performance of backfill configurations proposed in the WIPP Compliance Certification Application. Modeled the interaction of Salado Formation brine with MgO placed in the backfill to estimate the quantity of MgO required to buffer the pH of the indigenous brine between 8 and 9. This pH range is desirable for minimizing the solubility of plutonium and neptunium contained within the waste forms, and lowers the solubility of uranium and americium relative to lower pH values found in Salado Formation brine.

- Project scientist responsible for developing the background groundwater report for Norton AFB This report established background radionuclide concentrations in

local and regional groundwater and provided a robust scientific model to explain the presence of elevated levels of naturally-occurring uranium. The task required coordination of scientific and support staff to produce a principal milestone document that was delivered to the client one week ahead of schedule.

- Project manager and scientist on the FEMP OU5 FS task to evaluate aqueous reactions of metal and radionuclide complexes in proposed injection zones of the Great Miami Aquifer. Responsible for oversight of technical tasks, budget, schedule, and final technical report.

- Project scientist tasked with supporting the Navajo EPA on the evaluation of groundwater contamination from the mill tailings at the UNC Church Rock, New Mexico site. Radionuclide, sulfate and nitrate concentrations were evaluated to discriminate between contamination originating from the mill tailings and natural salts present in the valley alluvium.

- Project manager and scientist on the FEMP OU3 RI/FS task to evaluate the release of radionuclides and metals from the proposed on-site disposal facility. Responsible for oversight of technical tasks, budget, schedule, and final technical report.

1989 - 1994 ***Senior Geochemist, IT Corporation, Albuquerque, New Mexico*** Dr. Abitz evaluated the radiochemistry of transuranic elements in sodium-chloride brine for the WIPP Project and served as the project geochemist for four operable units on the FEMP RI/FS. He was also active setting up the LANL RMMA concept and provided radiochemistry support to INEL in developing a No Migration Variance Petition (NMVP) for the INEL calcine facility.

- Developed solubility database for the WIPP EATF. Evaluated the solubility of thorium, uranium, neptunium, plutonium, and americium in sodium-chloride brine and in the presence of organic complexing agents, such as EDTA and citric acid. Prepared solubility charts of the radionuclides over the pH range of 2 to 12.

- Authored white paper on geochemistry of FEMP site for OU 5 RI/FS. This paper discusses leaching, dissolution, and desorption processes that release uranium and its progeny from surface sources, adsorption and aqueous complexation of the solubilized uranium and progeny with subsurface soils and groundwater, and predicts secondary uranium phases that may form in the soils.

- Conducted site-surveys and interviewed LANL personnel on radiation practices associated with the handling, packaging, labeling, storage, transport, and disposal of transuranic materials. Information was used to develop LANL RMMA concept, where each RMMA is held accountable for all radiaoactive materials that enter and exit the area.

- Developed waste analysis plans for transuranic and low-level mixed wastes present

at LANL. This activity was conducted to complete RCRA Part B permits and ensure regulatory compliance to DOE orders for all LANL facilities that generate, store, or dispose of mixed waste.

- Managed and had technical oversight on geochemical program associated with FEMP RI/FS. Program tasks include the characterization of soil mineralogy by polarized light microscopy and x-ray diffraction studies, design and implementation of laboratory tests to characterize the composition of leachate derived from cemented and vitrified waste samples, evaluation of contaminant adsorption ratios, data validation, and tracking of labor and material costs.

- Designed laboratory experiments for FEMP RI/FS to measure adsorption ratios of radionuclides and metals and implemented ANSI/ANS-16.1 leach tests to evaluate the performance of cemented waste forms. Results were used to evaluate the most effective alternative for immobilizing radionuclides and metals from a near surface disposal cell.

- Led INEL waste characterization program on calcined solid waste. Responsible for evaluating radiochemistry data on uranium fission products and transuranic elements in aqueous and calcined waste forms. Provided assistance in the development of EPA approved sampling and analytical plans to support a draft no migration variance petition for the radioactive calcined waste stored at the ICPP.

Professional Affiliations

Geological Society of America
International Association of Geochemistry and Cosmochemistry

Presentations & Publications

Abitz, R.J., Farfan, E., and Coleman, R., 2011, Gamma-Ray Mapping and Waste Segregation, invited presentation to the Japan/USDOE October 26 & 27 workshop on clean-up of the Fukushima Nuclear Power Stations, Tokyo, Japan.

Szilagyi, A., P. Kirk, R. Abitz, and J. Gladden, 2011, The Office of Deactivation and Decommissioning Research and Development Program for Fiscal Year 2011, Paper 11533, Waste Management Symposia, Phoenix, AZ.

Abitz, R.J., 2010, Decommissioning Highly Contaminated Nuclear Facilities at the Department of Energy Sites, *Proceedings of the United Kingdom Decommissioning and Waste Management Conference*, Penrith, Cumbria, UK.

Abitz, R. J. and B. Darling, 2010, Anthropogenic Induced Redox Disequilibrium in Uranium Ore Zones, *Geological Society of America Abstracts w/Programs*, Vol. 42.

Abitz, R.J., 2010, Technical Basis for Approval of Decon Gel as an Acceptable Component of WIPP Waste Streams, *Proceedings of the American Nuclear Society Meeting on Decommissioning, Decontamination and Reutilization*, Idaho Falls, ID.

Abitz, R.J., A.J. Duncan, M.C. Kane, R.A. Dewberry and J.K. Santos, 2010, Planning for the Decontamination of the Plutonium Fuel Form (PuFF) Facility, Savannah River Site, South Carolina, Paper 10095, Waste Management Symposia, Phoenix, AZ.

Abitz, R.J., M. Denham, and C. Eddy-Dilek, 2009, Technical Evaluation of Soil Remediation Alternatives at the Building 812 Operable Unit, Lawrence Livermore National Laboratory, Site 300, SRNL-STI-2009-00514, Savannah River National Laboratory, Aiken, SC.

Abitz, R.J., 2008, The Need for Valid Statistical Protocols to Establish Baseline Groundwater Quality at Uranium ISL Mines, ***Geological Society of America Abstracts w/Programs***, Vol. 40.

Abitz, R., R. Danahy, R. Janke, B. McDaniel, and D. Seiller, 2004, "In Situ Gamma Spectrometry Applications at the United States Department of Energy's Fernald Site, Ohio, USA" *Proceedings of the 32nd International Geological Congress*, Florence, Italy.

Abitz, R., 1996, "Novel Use of Geochemical Models in Evaluating Treatment Trains for Radioactive Waste Streams" *Second International Symposium on Extraction and Processing for the Treatment and Minimization of Wastes*, The Minerals, Metals, and Materials Society, pp 167-176, Phoenix, Arizona.

Buck, E.C., N.L. Dietz, and R.J. Abitz, 1995, "The Nature of Uranium Phases at Fernald" ***American Chemical Society Book of Abstracts for Emerging Technologies in Hazardous Waste Management VII,*** Vol. I.

Deal, D. E., R. J. Abitz, D. S. Belski, J. B. Case, M. E. Crawley, C. A. Givens, P. James-Lipponer, D. J. Milligan, J. Myers, D. W. Powers, and M. A. Valdivia, 1995, "Brine Sampling and Evaluation Program, 1992-1993 Report and Summary of BSEP Data Since 1982," ***DOE-WIPP 94-011***, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R.J., 1994, "Uranium Specie Optimization in Carbonate Groundwater Prior to Anion Exchange Recovery," ***American Chemical Society Book of Abstracts for Emerging Technologies in Hazardous Waste Management VI,*** Vol. II, p. 1124.,

Beard, J.S., R.J. Abitz, and G.E. Lofgren, 1993, "Experimental Melting of Crustal

Xenoliths from Kilbourne Hole, New Mexico and Implications for Magma Contamination and Genesis," ***Contributions to Mineralogy and Petrology,*** Vol. 115, pp. 88-102.

Abitz, R. J., and M. Furhmann, 1993, "Adsorption of Radionuclides and Metals Below a Mixed-Waste Disposal Cell: Implications for Risk-Assessment Calculations," ***Geological Society of America Abstracts w/Programs***, Vol. 25, No. 6, p. A-185.

Abitz, R. J. and M. Fuhrmann, 1993, "A Case Study Comparing Site-Specific Distribution Coefficients to Selected Literature Distribution Coefficients," ***IT Technology Exchange Symposium Proceedings***, Vol.III, Paper 14-3, Scottsdale, Arizona.

Deal, D. E., R. J. Abitz, J. Myers, D. S. Belski, M. L. Martin, D. J. Milligan, R. W. Sobocinski, and P. James-Lipponer, 1993, "Brine Sampling and Evaluation Program, 1991 Report," ***DOE-WIPP 93-026***, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R. J., 1992, "Decision Support System for Obtaining Distribution Coefficients Used in Fate and Transport Models," ***IT Technology Exchange Symposium Proceedings***, Vol.III, Paper 12-2, Scottsdale, Arizona.

Abitz, R. J., 1991, "Evaluating Inorganic Contaminant Release and Attenuation with the EQ3/6 Geochemical Code," ***Geological Society of America Abstracts w/Programs***, Vol. 23, No. 4, p. A1.

Abitz, R. J., R. W. Sobocinski, and J. Myers, 1991, "Assessing Inorganic Contaminant Release to Groundwater with the EQ3/6 Geochemical Code," ***IT Technology Exchange Symposium Proceedings***, Vol. II, Paper 11-2, Phoenix, Arizona.

Deal, D. E., R. J. Abitz, J. Myers, J. B. Case, D. S. Belski, M. L. Martin, and W. M. Roggenthen, 1991 "Brine Sampling and Evaluation Program, 1990 Report," ***DOE-WIPP 91-036***, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Deal, D. E., R. J. Abitz, D. S. Belski, J. B. Clark, M. E. Crawley, and M. L. Martin, 1991 "Brine Sampling and Evaluation Program, 1989 Report," ***DOE-WIPP 91-009***, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R. J., J. Myers, P. E. Drez, and D. E. Deal, 1990, "Geochemistry of Salado Formation Brines Recovered from the Waste Isolation Pilot Plant (WIPP) Repository," ***Waste Management '90***, Vol. 2, pp. 881-891, Tucson, Arizona.

Abitz, R. J., J. Myers, P. E. Drez, and D. E. Deal, 1989, "Geochemistry of Salado Formation Brines Recovered from the Waste Isolation Pilot Plant (WIPP) Repository Horizon," ***Geological Society of America Abstracts w/Programs***, Vol. 21, p. A317.

Abitz, R. J., and G. A. Smith, 1989, "Stratigraphy and Depositional Features of the Peralta Tuff, Jemez Mountains, New Mexico," ***New Mexico Bureau of Mines and Mineral Resources***, Bulletin 131, p. 1.

Elston, W. E., and R. J. Abitz, 1989, "Regional Setting and Temporal Evolution of the Mogollon-Datil Volcanic Field, Southwestern New Mexico," ***New Mexico Bureau of Mines and Mineral Resources***, Bulletin 131, p. 82.

Deal, D. E., R. J. Abitz, D. S. Belski, J. B. Case, M. E. Crawley, R. M. Deshler, P. E. Drez, C. A. Givens, R. B. King, B. A. Lauctes, J. Myers, S. Niou, J. M. Pietz, W. M. Roggenthen, J. R. Tyburski, and M. G. Wallace, 1989 "Brine Sampling and Evaluation Program, 1988 Report," ***DOE-WIPP 89-015***, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R. J., and W. E. Elston, 1988, "Rising Melt Zones: Origin of the Volcanic-Arc to Within-Plate Magmatic Transition in Ignimbrites During Extensional Stages of Orogenies," ***Geological Society of America Abstracts w/Programs***, Vol. 20, p. A74.

Abitz, R. J., and G. A. Smith, 1988, "Stratigraphy and Depositional Features of Small-Volume Pyroclastic Flows: Peralta Tuff, Jemez Mountains, New Mexico," ***EOS, Transactions, American Geophysical Union***, Vol. 69, p. 154.

Abitz, R. J., and D. G. Brookins, 1987, "Evolution of Oligocene Volcanism Adjacent to the Southern Rio Grande Rift," ***EOS, Transactions, American Geophysical Union***, Vol. 68, p. 1532.

Abitz, R. J., and R. K. Matheney, 1987, "Sr and O Disequilibrium in A Welded High-Silica Rhyolite Tuff," ***Geological Society of America Abstracts w/Programs***, Vol. 19, p. 566.

Abitz, R. J., D. B. Ward, and D. G. Brookins, 1987, "Rb-Sr Age for Lower Crust in the Southern Rio Grande Rift, New Mexico," ***Isochron/West***, No. 49, pp. 8-12.

Elston, W. E., and R. J. Abitz, 1987, "Characterization of Non-Basaltic Post-40 Ma Magmatic-Tectonic Provinces of Southwestern North America by Potassium Contents," ***Geological Society of America Abstracts w/Programs***, Vol. 19, p. 655.

Elston, W. E., W. R. Seager, and R. J. Abitz, 1987, "The Emory Resurgent Ash-Flow Tuff (Ignimbrite) Cauldron of Oligocene Age, New Mexico," ***Geological Society of America Centennial Field Guide, Rocky Mountain Section***, pp. 441-445.

Reisinger, H. R., J. Wagener, and R. J. Abitz, 1987, "An Oligocene Ash-Flow Tuff Vent Correlated to a Regional High-Silica Rhyolite Tuff Sheet," ***Geological Society of America Abstracts w/Programs***, Vol. 19, p. 815.

Abitz, R. J., 1986, "Geology of Mid-Tertiary Volcanic Rocks of the East-Central Black Range, Sierra County, New Mexico: Implications for a Double-Cauldron Complex in the Emory Cauldron," ***New Mexico Geological Society Guidebook 37***, pp. 161-166.

Abitz, R. J., 1985, "Rare Earth Element and Strontium Isotope Constraints on the Evolution of Mid-Tertiary Volcanic Rocks in the Black Range, New Mexico," ***Geological Society of America Abstracts w/Programs***, Vol. 17, p. 205.

Abitz, R. J., 1985, "Stratigraphy and Structure Along the Northern Margin of the Emory Cauldron, Northern Black Range, Sierra County, New Mexico," ***Geological Society of America Abstracts w/Programs***, Vol. 17, p. 205.