

David A. Chace

Mr. Chace has more than 28 years of experience in the characterization of hydrogeologic systems associated with deep geologic radioactive waste repository programs. He has worked extensively in the area of site characterization and performance assessment associated with nuclear waste repository programs in the United States, Canada, France, and the United Kingdom performing and interpreting hydraulic tests, conducting performance assessment modeling and developing and evaluating specialized equipment and instrumentation for the conduct of these tests. Mr. Chace has participated in both deep borehole testing and tests in underground facilities (WIPP), designing the tests, developing specialized hardware and instrumentation, and analyzing the data. While working at the Waste Isolation Pilot Plant (WIPP) he was involved in a variety of tests including hydraulic pulse and constant pressure testing, gas threshold pressure testing, hydro-fracturing tests, multi-well tracer tests, sinusoidal rate tests, and conventional constant-rate drawdown and recovery tests. While working in Canada he was responsible for the design and development of the downhole straddle-packer hydraulic test tool as well as the associated equipment needed to conduct the pulse-injection/withdrawal and slug-injection/withdrawal tests. This also included the conduct of over 250 hydraulic tests in low-permeability systems in 5 deep and 2 shallow boreholes and the design and development of a mobile integrated aquifer testing & analysis (MIATA) platform for the client.

Hydraulic Testing Experience

Union Gas Ltd: Testing of Borehole UB.13, near Sarnia, Ontario, Canada. 2013. Hydraulic Testing Engineer/Technician Designed and developed straddle-packer hydraulic testing equipment used for the generation of hydraulic parameter estimates associated with the confining layers overlying a natural gas storage reservoir. The objective was to demonstrate that the overlying cap rock layers were of sufficiently low permeability that the pressure in the storage reservoir could be increased, thereby increasing the storage volume, without increasing the risk of gas leakage to the accessible environment. HydroResolutions deployed its MIATA platform including a project-specific hydraulic testing tool and associated equipment to conduct hydraulic tests of 15 packer isolated intervals in a vertical borehole 493 meters in depth.

Energy Resources of Australia: Ranger 3 Deeps Testing. 2013. Hydrogeologic Testing Engineer/Technician Designed hydraulic tests and associated equipment, performed, and analyzing straddle-packer hydraulic tests in vertical and deviated boreholes up to 350 meters in depth in close proximity to an open pit uranium mine. This effort was the foundation to predict flow and transport parameters into a decline drift. The units tested were very low-permeability and exhibited non-radial flow and required specialized hydraulic testing equipment, techniques, and analysis methods to provide appropriate hydraulic parameter estimates as input for the flow and transport modeling effort.

Nuclear Waste Management Organization/Ontario Power Generation (Canadian Deep Geologic Nuclear Repository Program), Kincardine, Ontario, Canada. 2007 – 2011.. Hydraulic Testing Engineer/Technician Responsible for all phases of the hydraulic testing campaigns in the low-permeability systems accessed by the deep DGR boreholes (both vertical and slanted up to 1000 meters) at the Bruce Power Site. This effort was part of site characterization to assess suitability of low permeability formations for radioactive waste disposal. Responsibilities included the design and development of specialized downhole hydraulic testing tools (HTT) and surface equipment associated with the conduct of hydraulic tests, the planning, conduct, and analysis of hydraulic tests, test design, test equipment review, coordination of field activities with other contractors, data acquisition, data analysis, and reporting.

Years of Experience: 28

Education:

- M.S. Hydrology, 1993, New Mexico Institute of Mining and Technology
- B.S. Hydrology & Water Resources, 1990, Tarleton State University

Professional Registrations/Affiliations:

- National Ground Water Association
- Society of Petroleum Engineers

Professional History:

- 2008– present Principal & Managing Member - HydroResolutions
- 2001 – 2008 Senior Member Technical Staff – Sandia National Laboratories
- 1993– 2001 Hydrologist – INTERA, Inc./Duke engineering & Services
- 1990 – 1993 Research Assistant – New Mexico Institute of Mining and Technology
- 1990 – 1990 U.S. fish & Wildlife Service

Specialized Training:

- OSHA 40 Hour HAZWOPER
- MSHA 40 Hour Underground Experienced Miner Training
- 29 CFR 1910 40-Hour Health and Safety Training
- Well Test Interpretation in Practice (Scientific Software-Intercomp)

Waste Control Specialists (WCS) (Low-Level Radioactive Waste Repository), Andrews, Texas. 2008 & 2011. *Hydraulic Testing Engineer/Technician* Responsible for all phases of the low-permeability gas-injection testing program at the WCS site and for all phases of the conventional liquid hydraulic testing between packers in a deep borehole. Responsibilities included design and development of HTTs and specialized hydraulic testing equipment used for the gas injection tests, and coordinating testing activities with other contractors, design and development of the straddle-packer HTT and associated downhole and surface equipment as well as the conduct of the hydraulic tests in the low-permeability systems. Gas tests performed were conducted in low-permeability unsaturated formations in both vertical and slanted boreholes. Liquid tests were performed in a deep (> 2000') vertical borehole.

Waste Isolation Pilot Plant (WIPP), Carlsbad, New Mexico. 2001-2008. *Hydraulic Testing Lead* Responsible for planning and implementing the aquifer testing program as part of the Sandia National Labs Culebra and Magenta Formation characterization efforts at the WIPP site. Responsibilities included hardware acquisition, design and development of multiple MIATA platforms from which the hydraulic testing activities were controlled, development of a mobile data acquisition system with real time graphics (included in the MIATA platform), field operations management, data analysis, and reporting. Testing was conducted in both open boreholes and packer isolated intervals up to 425 meters deep.

ANDRA (French National Radioactive Waste Management Agency), Avon, France. 1996 & 2000 - 2001. *Hydraulic Testing Engineer/Technician* Responsible for providing aquifer hydraulic test planning and field operations supervision as part of site characterization to assess suitability of low permeability formations at the La Chapelle Baton and Joinville sites in France being considered for radioactive waste disposal. Responsibilities included test design, test equipment review, coordination of field activities with other contractors, data acquisition, data analysis, and reporting.

WIPP Underground (Deep Geologic Radioactive Waste Repository), Carlsbad, NM. 1993- 1996: *Hydraulic Testing Technician* Responsible for all phases of the low permeability testing program in the underground facility at the WIPP site. Tests performed included permeability tests, gas threshold pressure tests, and hydro-frac tests. In addition to analyzing the tests described above, analyses of sinusoidal pumping tests conducted in the Culebra dolomite were performed. All equipment calibrations, field testing, data documentation, and data-interpretation activities were implemented under Quality Assurance Procedures that address ANSI/ASME NQA-1.

Selected Publications, Presentations, and Reports

Avis, J.D., R.M. Roberts, D.A. Chace, N.J. Toll, and R.L. Beauheim. 2009. Hydraulic testing to characterize low-permeability sedimentary formations – proposed Deep Geologic Repository, Tiverton, Ontario. 62nd Canadian Geotechnical Conference & 10th Joint CGS/IAH-CNC Groundwater Conference.

Beauheim, R.L., J.D. Avis, D.A. Chace, R.M. Roberts, and N.J. Toll. 2009. Hydraulic Testing of Silurian and Ordovician Strata at the Bruce Site. AGU (poster presentation).

Roberts, R.M., Bowman, D.O., Chace, D.A., Toll, N.J., and Beauheim, R.L. 2008. Analysis of Straddle-Packer Hydraulic Tests in DGR-1 and DGR-2. TR-07-13. DGR Site Characterization Document, Intera Engineering, Ottawa, Ontario. In review.

Chace, D. A. and Randall M. Roberts. 2004. South-Central Salt Basin Groundwater Characterization; Last Chance Water Company. American Asso. Of Petroleum Geologists; Field Guide Book for the Otero Mesa Area, NM.

Chace, D.A., R.M. Roberts, J.B. Palmer, M.B. Kloska, M.D. Fort, G.J. Martin, and W.A. Stensrud, 1997. Waste Isolation Pilot Plant Salado Hydrology Program Data Report #3. Sandia National Laboratories, SAND97-1880, Albuquerque, New Mexico.

Stensrud, W.A., D.A. Chace, C.A. Chester, G. J. Saulnier, Jr., 1997. Exhaust Shaft: Hydraulic Assessment Data Report: Waste Isolation Pilot Plant, Carlsbad, New Mexico. DOE/WIPP 97-2219.

Paris, B., I. Armand, D. Chace, and A. Laurent, 1996. Rapport final des tests hydrogeologiques sur le site de forage d'exploitation CHA212 de la Vienne. Prepared for ANDRA, B RP 1GSV 96-090, Chatenay-Malabry, France.