G.D. BECKETT, Hydrogeologist & President

Mr. Beckett is the President and founder of **AQUI-VER, INC.**, providing specialized hydrogeologic and environmental consulting services to major petroleum companies, DOD, consultants, and others. Mr. Beckett is also a research associate and has instructed at San Diego State University where he investigates various aspects of contaminant hydrogeology. At a prior company, Mr. Beckett was a senior project manager for major petroleum and industrial clients. He has directed site characterization studies (geologic, hydrogeologic, and chemical), risk assessment, and remediation designs leading to site regulatory compliance and closure. These job functions require a comprehensive understanding of the controlling chemical, hydraulic, and physical phenomena. Mr. Beckett has reviewed and/or generated closure strategies for hundreds of sites and has demonstrated an ability to find effective solutions for even the most difficult problems.

Under Mr. Beckett's guidance and publishing, **AQUI-VER, INC.** (AVI) has developed new scientific techniques and analyses to evaluate mulitphase contaminant transport, remediation, and environmental risk. These new and rigorous science applications have led to a nearly flawless site cleanup and closure record. Science has been shown to describe real processes that control site environmental risk and the design of efficient and effective cleanup systems (as needed). These technical credentials have allowed Mr. Beckett to provide training to regional regulatory agencies, including the EPA and others, on behalf of industry groups including the American Petroleum Institute. Mr. Beckett is a leader in the field of non-aqueous phase liquid (NAPL) contamination and cleanup including petroleum products, solvents, oils, and other compounds.

EDUCATION & CERTIFICATIONS

* California Registered Geologist
* California Registered Hydrogeologist
* M.S., Geology, Hydrogeology Emphasis, San Diego State University (4.0/4.0 GPA)
* B.S., Geology, Hydrogeology Emphasis, San Diego State University.
* 40 hour OSHA 29 CFR 1910.120; 8 hour OSHA Annual Refresher
* Pertinent Course Work
  - Hydrogeology
  - Sedimentology
  - Well Hydraulics and Testing Methods
  - Exploration Techniques in Ground Water (audit)
  - Solute Transport

EDUCATION (continued)

- Numerical Modeling of Fluid Flow in Geologic Media
- Immiscible-Phase Fluid Hydraulics in Porous Media
- Behavior of Subsurface Organic Contaminants (audit)
- Vapor Phase Dynamics and Transport of Organic Compounds
- Conference; Immiscible-Phase Organic Contaminants in Porous Media. Conference focused on the principles and modeling of immiscible-phase organic contaminants in the subsurface, and remediation strategies.
- Organic Chemistry
- Geochemistry
- Ground Water Geochemistry
- Environmental Chemistry
- Risk Assessment
- Conservation of Environmental Quality
- Other related science and math course work

ACADEMIC AND PROFESSIONAL HONORS

* Awarded Outstanding Senior Thesis by Faculty and Peers

* Awarded a Scholastic Scholarship for Master of Science work by the Academic Rewards for College Scientists (ARCS) Foundation

* Guest Lecturer, 1993 Graduate Course in Vapor Phase Dynamics and Transport of Organic Compounds in the Vadose Zone, Department of Geological Sciences, San Diego State University. Instructor: Donn L. Marrin.

* Guest Lecturer, 1994, 1995, Graduate Course in Well Hydraulics, Department of Geological Sciences, San Diego State University. Instructor: David Huntley.

* Certificate of Honorable Mention, 1997. In Recognition of Presentation Excellence and Scientific Quality of the Paper. Division of Environmental Geosciences, American Association of Petroleum Geologists (AAPG).

* Instructor, 1997, 1998, 1999, 2000, 2001, Conference work shop on the relationships between LNAPL recovery and risk, hosted by the American Petroleum Institute and preceding the Petroleum Hydrocarbons & Organic Chemicals in Ground Water Conference, Houston, Texas, sponsored by the National Ground Water Association & American Petroleum Institute.

* Graduate Course Instructor, 1998, Multiphase Flow, Geology 651, Department of Geological Sciences, San Diego State University. Course in multiphase flow, remediation and risk.

ACADEMIC AND PROFESSIONAL HONORS (continued)

* Short-course Instructor, March 2000, Multiphase Screening Methods to Determine Fuel Immobility in Soil, AEHS West Coast Conference, San Diego, California.

PUBLICATIONS

* Beckett, G.D., Huntley, D., 1994, Characterization of flow parameters controlling soil vapor extraction: Ground Water, Vol. 32, No. 2, pp. 239-247.

* Beckett, G.D., Huntley, D., 1994, The Effect of Soil Characteristics on Free-Phase Hydrocarbon Recovery Rates: Proceedings of the Petroleum Hydrocarbon and Organic Chemicals in Ground Water; November 2-5, 1994, Houston, Texas, NGWA, API.

* Beckett, G.D., Huntley, D., Panday, S., 1995. Air Sparging: A Case Study in Characterization, Field Testing, and Modeling Design. Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection and Restoration, Houston, Nov. 1995.

* Beckett, G.D., Benson, D.A, 1996. Diffusion Limited Soil Vapor Extraction: Geologic and Bed Thickness Controls. AAPG Annual Convention, San Diego, California, May 1996.

* Beckett, G.D., Huntley, D., Wiedlin, M.P., 1996. Hydrocarbon Fate and Transport Predictions: When Are One-dimensional Solute Transport Calculations Valid? AAPG Annual Convention, San Diego, California, May 1996.

* Beckett, G.D., Huntley, D., 1997. Hydrocarbon Fate and Transport Predictions: When Are One-dimensional Solute Transport Calculations Valid? (Updated). AEHS West Coast Annual Convention, Oxnard, California, March 1997.

* Huntley, D., Beckett, G.D., 1997. The Life and Times of LNAPL Pools. An investigation into the lifespan and time-dependent magnitude of dissolved-phase impacts from free-phase hydrocarbon pools. AEHS West Coast Annual Convention, Oxnard, California, March 1997.

* Beckett, G.D., Lundegard, P.D., 1997. Practically Impractical - The Limits of LNAPL Recovery and Relationship to Risk. Conference Proceedings of the 1997 Petroleum Hydrocarbons & Organic Chemicals in Ground Water. Houston Texas, sponsored by the National Ground Water Association & American Petroleum Institute.

* Huntley, D., Beckett, G.D., 1997. Persistence of LNAPL Sources and Relation to Risk. Conference Proceedings of the 1997 Petroleum Hydrocarbons & Organic Chemicals in Ground Water. Houston Texas, sponsered by the NGWA and API.

PUBLICATIONS (continued)

* Beckett, G.D., Huntley, D., 1998. Soil Properties and Design Factors Influencing Free-phase Hydrocarbon Cleanup. January 1998, Environmental Science and Technology.

* Huntley, D., Beckett, G.D., 1999. Relationship Between Risk Reduction and LNAPL Recovery. Conference Proceedings of the 1999 Petroleum Hydrocarbons & Organic Chemicals in Ground Water, Houston, Texas, sponsored by the National Ground Water Association & American Petroleum Institute.

* Peargin, T.R., Wickland, D.C., Beckett, G.D., 1999. Evaluation of Short Term Multi-phase Extraction Effectiveness for Removal of Non-Aqueous Phase Liquids from Groundwater Monitoring Wells. Conference Proceedings of the 1999 Petroleum Hydrocarbons & Organic Chemicals in Ground Water, Houston, Texas, sponsored by the National Ground Water Association & American Petroleum Institute.

* Lundegard, P.D., Beckett, G.D., 2000. Practicability of LNAPL Recovery - Implications for Site Management. Battelle 2nd International Conference on Remediation of Chlorinated and Recalcitrant Compounds; May 2000.

* Beckett, G.D., 2000. Soil Vapor Extraction under Capped and Uncapped Surface Conditions. Geotechnical Fabrics Review; vol 18, #4.

* Beckett, G.D., 2000. Remediation is Enhanced Oil Recovery: Know Your Source. AAPG & SPE Convention, Long Beach, California, June 2000.

* Huntley, D., Beckett, G.D., 2002. Persistence of LNAPL Sources: Relationship Between Risk Reduction And LNAPL Recovery. Journal of Contaminant Hydrology, in press.

ANALYTIC EVALUATIONS AND MODELING EXPERIENCE

* Extensive familiarity with analytic aquifer modeling and test analysis techniques, including development of related software. Testing and evaluation conditions include confined, unconfined, leaky, fractured, anisotropic, and other flow conditions by any of several analytic techniques.

* Vadose Zone Testing - Familiar with Guelph and open-hole permeameter testing and analysis. Working knowledge of tensiometer, lysimeters, gamma logs, and other vadose zone monitoring equipment and downhole geophysics.

* SVE Testing - Developed transient vapor extraction test methodologies as published by Journal of Ground Water (1994). Extensive evaluations of vapor recovery and chemical partitioning data as pertain to cleanup design, cleanup limits, and vapor-phase health/environmental risk.

ANALYTIC EVALUATIONS AND MODELING EXPERIENCE (continued)

* Sparge Testing - Developed physical/chemical testing methodologies to relate field effectiveness diagnostics to cleanup goals and system design. This study was part of a Petroleum Environmental Research Forum (PERF) investigation.

* Dual-phase Recovery - Developed diagnostic data collection protocols for a prime contractor working on several military installations. Determined that many standard methods of dual-phase cleanup often fail to treat zones of interest below the water table.

* Extensive familiarity with analytic and numerical models pertaining to ground water flow, unsaturated zone flow, multiphase flow, contaminant transport, and remediation, as well as programming capability in Basic, VisualBasic and C.

* With coauthor David Huntley, developed a multiphase analytic model and software to evaluate the relationship between fuel sources in the water table region, cleanup strategies, contaminant transport, and risk. Funded by the American Petroleum Institute.

PROFESSIONAL WORK HISTORY

* October 1993 - Present: President and Hydrogeologist at **AQUI-VER, INC.** (AVI), Hydrogeology, Water Resources & Data Services. AVI specializes in quantitative hydrogeologic services including contaminant fate and transport evaluations, remediation design and feasibility assessment, and human health risk assessment. Mr. Beckett directs research and projects in those areas.

* January 1992 - Present: Research Associate, San Diego State University. This unsalaried position focuses research on better understanding of contaminant migration, cleanup and risk. Research includes extensive use of computer modeling and field data examination.

* December 1989 - March 1992: Project Manager (promoted to senior at 2 year review), Alton Geoscience. Responsible for the direction of environmental studies, site closure strategies, reporting, and regulatory coordination. Duties included point person to Texaco Refining and Marketing Inc., technical leader in the Subsurface Testing and Remediation Planning Group, corporate hydrogeologic peer reviewer, hydrogeologic trainer, and other tasks.

* January 1989 - December 1989: Environmental Analyst, ERCE Environmental and Energy Services Company. Responsible for field data collection, report generation, and general support tasks at a variety of sites including military bases, service stations, and industrial sites. Duties were later expanded to include field project management.

* March 1988 - December 1988: Hydrogeologic Field Technician, working part-time with Dr. David Huntley, Professor of Geological Sciences, San Diego State University.

REPRESENTATIVE PROJECTS

* American Petroleum Institute: Selected contractor for development of a risk-based toolkit entitled "Evaluating the Necessity of Hydrocarbon Removal from Source Zones: Tools for Assessing Risk Reduction." This work incorporates multiphase flow and remediation dynamics with dissolution of chemicals from the LNAPL source to allow users to estimate the risk magnitude and longevity from different release and cleanup conditions. It also allows the user to consider the risk/benefit of remediation efforts and cost. On a second related API contract, AVI is building a parameter database pertaining to LNAPL spills and cleanup. AVI has an extensive in-house LNAPL parameter database, and applies that parametric experience to new sites, often reducing or eliminating the need for expensive data collection.

* New Pacific Properties - Designed the field ground truth and proof of concept program for a multimillion dollar remediation of a former refinery that required cleanup of free product and related chemicals, including MTBE. The remediation program was implemented by IT Corporation. Using an innovative approach that capitalized on multiphase synergies, the cleanup reduced impacts to below human health-based standards in less than 6-months, and a no further action letter was received from the California Regional Water Quality Control Board, effectively allowing development to proceed. Through AVI's approach, it became clear the original remediation design by another contractor, using standard and accepted industry approaches, was insufficient to meet the cleanup goals for the property because it did not correctly consider the multiphase aspects of the cleanup.

* Confidential Client - Designed a state-of-the-science controlled field study of air-sparging to lead to feasibility assessment and design at a hydrocarbon-affected site. Tasks include numerical modeling, pilot study work plan and direction, refinement of numerical results, feasibility assessment, and system design. The project was part of a Petroleum Environmental Research Forum (PERF) study on air sparging. The cleanup design predicted operations to be complete in less than 1 year (for benzene), actual system run-time was 6 months.

* Confidential Client - Performed a Human Health Risk Assessment for a site underlain by a plume containing petroleum compounds above regulatory action levels and overlying a utilized drinking water aquifer. Rigorous but inexpensive information was collected to ground-truth the chemical fate and transport component of the risk assessment. Results of the risk assessment indicated less than *de minimis* risk and the site received a site closure letter from the lead agency (no further action under current site operations and conditions).

* Confidential Client - In a two-party litigation, performed expert review of opposing sides aquifer test methodology and analysis that purportedly implicated a major petroleum company as the 80% responsible party for a petroleum hydrocarbon plume. AVI showed that the test methodology was invalid and could not be used as evidence for the suggested contaminant transport. Our work pointed out that the data also were not appropriate as input into risk assessment or remediation planning studies. Analyses and modeling clearly suggested the other party was likely responsible for most of the impacts and associated costs.